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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII — CLEVELAND, OHIO, JUNE 16, 1904 — NUMBER 24

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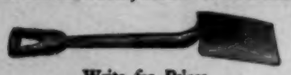

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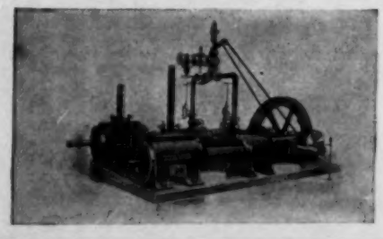

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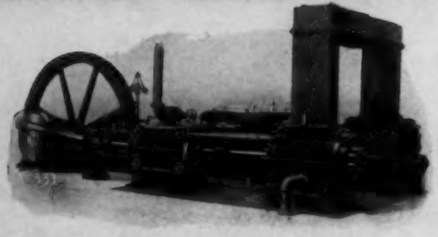

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, JUNE 16, 1904 NUMBER 24

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Restriction in pig iron production is still under way and mid-summer promises to show a marked falling off from the high point reached in April, when furnace output was at the rate of 19,000,000 tons a year. An accumulation of 100,000 tons of merchant furnace pig iron in May, and a falling off in active capacity between May 1 and June 1, from what would produce 19,000,000 tons a year to what would produce 17,500,000, shows that the slowing down process is not only needed but that a vigorous beginning has been made. In the past week one merchant furnace and four steel works blast furnaces in the Central West (three at Mingo Junction and one at Cleveland) have been added to the list. In addition the closing of two Bessemer steel plants is announced and the open-hearth plant at South Sharon, Pa., is to go out. Decreasing consumption of iron and steel are plainly reflected in the June 1 statistics as well as in the news of the week, and the recent curtailment, with the exception of one furnace in the Chicago district, has had no relation to the restricted movement of ore on the lakes. The strike as a factor in the iron market is no longer to be considered. Its complete collapse has come in the last 24 hours and before the end of the week a large fleet will be under way. As against about 7,000,000 tons of iron ore brought down at this time last year, the present season's movement has been less than 100,000 tons.

With July 1 but two weeks ahead, labor questions are important to the iron trade, particularly as the bar iron conference has adjourned without agreement, after the manufacturers had pressed vigorously for a reduction of 15 percent from last year's scale, with a $4.50 base price for puddling instead of $5 on 1c bar iron. The sheet and tin plate scales also present large obstacles to agreement, and the probability of several weeks' idleness after July 1 in the various rolling mills governed by the Amalgamated Association scale is not remote.

The maintenance of association prices on certain controlled products would naturally be aided by a prolonged summer shutdown, but this would not affect billets, rails, plates or structural material, which are practically independent of labor agreements. The fact that billets have been sold as low as $20, Pittsburg, and the reported cutting of prices of plates have brought under discussion the revision of agreed prices at the next meetings of the various pools. One year ago rail prices for 1904 had been fixed and some contracts had been booked, but conditions are not now present for any early fixing of prices for next year. The sale of 20,000 tons by a Pennsylvania mill to the Harriman roads is reported for the past week, and of 10,000 tons to a Canadian road, these latter to be rolled in the Chicago district. In other finished products the week has brought fair activity, something more, perhaps, than producers looked for. The condition as to structural material has improved and the demand for wrought pipe and tubes is surprisingly well maintained. Plate mills bid fair to make a record for 1904 about half that for 1903. Wire products are being cut $1 a ton, but no official publication of new prices is made as yet.

The pig iron market shows small sign of getting out of its rut, and though little iron is yet bought for the third quarter, producers are looking for a quiet summer. The possibility of a coal miners' strike in Alabama on July 1 may have prompted some of the buying of the past week, which in the case of one important Southern company was of fair proportions. The $9 basis is now more general.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, JUNE 15.

The iron and steel trade continues in an unsettled condition, and the general tendency of the entire market is still towards a lower basis. One merchant furnace, three steel works furnaces and two Bessemer plants, all in Ohio, were added to the list of idle capacity during the week, while one Western Pennsylvania merchant stack and the Corporation steel furnaces at Sharon, Pa., will be on the idle list within the next two or three weeks. Consumers generally are of the opinion that the entire market will be readjusted on a lower basis during the summer months, and the shutting down of furnaces and steel works will bring about this revision sooner than otherwise would have been the case. Reports are numerous of shading in billets, as low as $20 Pittsburg having been reported on a 3,000-ton lot, while a conversion arrangement entered into by a Western Pennsylvania steel plant will give the consumer billets close to $18. With Bessemer iron selling at $12.85 to $13 Pittsburg, the spread to billets on the present basis of $23 is too great to be maintained. With a revision of billet prices there will no doubt be a readjustment in other finished lines dependent upon the billet schedule. Meetings of the billet, structural and steel bar associations will be held early in July for considering these matters, and there is a bare possibility that the rail association will meet for the purpose of considering next year's prices. Last year the rail prices for 1904 were fixed in the latter part of June, and the Pennsylvania railroad was the first large buyer in the market. Heavy shading on plates is reported, amounting to $4 and $5 a ton by mills outside of the association. Thus far this year the output of the plate mills has been about 50 percent of that in the same period last year, and the indications are that for the year it will maintain the same ratio. On structural material and rails the mills are showing a slightly better record; in pipe, while there is not as great an output as in the same period last year, the production exceeds that of the first six months of 1902.

Despite the concessions that are being offered by many of the independent pipe mills on merchant pipe, thus greatly demoralizing the market, some very large contracts were closed during the past week, and the purchase of 9,000 tons of iron skelp by one of the leading mills would indicate that the merchant pipe trade continues very heavy. There is little demand for sheets, either black or galvanized, and 2.15c can be done on 28-gauge black sheets in carload lots. Bars, both iron and steel, continue extremely quiet, while little new business in plates or structural material has been placed. The railroads are not ordering rails for this year's delivery, and

the 1904 tonnage now unfilled on the books of the rail makers will not be greatly added to during the last half of the year.

The pig iron market has been a little more active than for some time, one of the leading concerns having purchased 6,000 tons of charcoal iron for delivery during the year beginning July 1, while an Ohio concern purchased 3,000 tons of Bessemer iron for delivery during the next four months at a price slightly below $12 at the furnace, and 5,000 tons of basic was sold to a Western Pennsylvania steel casting plant at about $12 Valley. On No. 2 foundry iron $12.75 Pittsburg is the open quotation, although 1,000 tons was sold by a merchant furnace in this district for Eastern delivery at $13 at the furnace. High grade forge iron is offered at $12.50 Pittsburg, and it is possible that this price could be shaded on a desirable quantity. Southern furnaces are still quoting from $9 to $9.25 Birmingham for No. 2, and on forge $8 could be readily done.

The protracted bar iron conference at Cambridge Springs and the demands of the manufacturers for a lower card based on $4.50 for puddling do not indicate an early settlement, while no date has yet been fixed for holding the sheet and tin plate conference, and there will be a general shutting down of the sheet and tin mills on July 1, as the manufacturers and the workers are entirely too far apart in their demands to have these scales arranged before that date.

There is some inquiry for coke for second half delivery, but practically none has been sold. The basis for furnace coke for this delivery will be $1.45 to $1.50 for strictly Connellsville, and $1.85 to $1.95 and possibly $2 for foundry.

Pig Iron.—The list of idle furnaces was still further increased during the week by the shutting down of the Ella stack at West Middlesex and the three furnaces of the Carnegie Steel Co. at Mingo Junction, O. One Western Pennsylvania stack contemplates shutting down the latter part of this month or early in July. Blast furnace statistics, as compiled by J. G. Butler Jr., of Youngstown, O., show 119 operative stacks out of a total of 162 tributary to the Lake Superior ore region on June 1, or an idle capacity of 20 percent. On May 1 the idle capacity was only 10 percent, on April 1 15 per cent, and March 1 28 percent. On the other hand the idle capacity on Jan. 1 amounted to 64 percent. One leading interest is in the market for 2,000 tons of Southern forge and expects to close at $8 Birmingham. On No. 2 foundry the open quotation is $12.75 Pittsburg, while a desirable order could probably be placed at a slightly lower figure. On forge iron $12.50 could be readily done. We revise quotations as follows:

Bessemer, Valley	$12 00 to 12 15
Bessemer, Pittsburg	12 85 to 13 00
No. 1 Foundry	13 00 to 13 25
No. 2 Foundry	12 65 to 12 75
Gray forge, Pittsburg	12 40 to 12 50
Chilled basic, Valley	12 00 to 12 15
Chilled basic, Pittsburg	12 85 to 13 00

Steel.—The billet market is in a very unsettled condition, one sale of 3,000 tons being reported at $20 Pittsburg for delivery after July 1, a probable reduction no doubt having been discounted. On conversion arrangements close to $18 Pittsburg could do doubt be done. A readjustment of the entire billet schedule is looked for at the coming meeting of the billet manufacturers in view of the great spread between steel and Bessemer iron. Association prices are as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs up to and including 0.25 carbon, $23, Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; 0.26 and including 0.60 carbon, $1 advance; and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheets and tin bars are $1 per ton extra. Bessemer and open-hearth rods are still quoted at $30 to $31 Pittsburg.

Ferro-Manganese.—The market continues quiet, and domestic ferro, 80 percent, is held at $41.50 to $42.50, according to quantity, delivered at buyer's mill at a point east of the Mississippi.

Spelter.—The market continues weak, and prime Western grades are held at 4.62c to 4.65c, delivered in carload lots Pittsburg.

Muck Bar.—The market continues quiet and all pig muck iron is held at $25 Pittsburg, while lower grades can be had at $24 to $24.25.

Skelp.—We note the sale of 9,000 tons of sheared skelp at 1.52½c Pittsburg. Grooved iron is held at 1.47c, while both grooved and sheared steel are held at 1.35c to 1.40c.

Rails and Track Material.—Low prices continue to prevail on light rails. Twenty-five to forty pound sections are selling at $20.50 to $21.50, while 16 to 25-pound sections are held at $22.50 to $23.50. Little new business is being placed in standard sections. We revise quotations as follows: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 to 25 pounds, $22.50 to $23.50; 25 to 40 pounds, $20.50 to $21.50. Track material: Spikes, 1.65c to 1.70c.

Plates.—The plate output thus far this year has been about 50 percent of that during the same period last year. Plate specifications are now being received by local mills from the steel car interests as a result of the steel car orders recently placed. Mills outside of the association are shading prices from $4 to $5 per ton on the sizes they make, and are taking some business. We quote agreed prices as follows: Tank plates, ¼ inch thick and up to 100 inches ih width, 1.60c at mill Pittsburg; flange and boiler steel, 1.70c marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.85c; locomotive firebox, not less than 2.10c; and it ranges in price to 3c. Plates more than 10 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots with 5c extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

Bars.—There is little demand for either iron or steel bars, and specifications on running contracts are light. On iron bars there would be little difficulty in doing 1.25c Pittsburg. We make the following quotations: Bar iron, 1.25c to 1.30c Pittsburg for local delivery, while for Western shipment quotations are based on 1.25c to 1.30c Pittsburg. Hoops are held at 1.55c base, and bands at 1.35c taking bar extras. Bessemer steel bars, 1.35c; open-hearth. 1.40c; plow beams and cultivator beams, 1.35c net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.45c. The following differentials are maintained on steel: Less than 2,000 pounds of a size, not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Structural Material.—The American Bridge Co. has secured contracts for furnishing the steel work for four new buildings to be erected at Baltimore, aggregating about 2,500 tons, while the contract for the Missouri Pacific shops at Sedalia, Mo., calls for about 2,000 tons. The contract for the Wabash elevated tracks still remains unplaced. Small orders for structural material are numerous and the mills are in very good shape so far as tonnage is concerned during the next four weeks. Quotations are unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Sheets.—Little new business in either black or galvanized sheets is being placed and the new list of the leading producer is already being shaded $1 a ton. On carload lots, black sheets, 2.15c, is already being quoted, while no difficulty would be experienced in doing 2.10c on a desirable order. We make the following quotations, carload lots: No. 8, 1.60c to 1.65c; No. 9, 1.65c to 1.70c; Nos. 12-14, 1.70c to 1.75c; Nos. 15-17, 1.80c to 1.85c; Nos. 18-21, 1.90c to 1.95c; Nos. 22-24, 1.95c to 2c; Nos. 25-26, 2c to 2.05c; No. 27, 2.05c to 2.10c; No. 28, 2.15c to 2.20c; No. 29, 2.45c to 2.50c; No. 30, 2.55c to 2.60c. Galvanized: Nos. 12-17, 2.25c to 2.30c; Nos. 18-21, 2.40c to 2.45c; Nos. 22-24, 2.55c to 2.60c; Nos. 25-26, 2.75c to 2.80c; No. 27, 2.95c to 3c; No. 28, 3.15c to 3.20c; No. 29, 3.50c to 3.60c; No. 30, 3.90c to 4c.

Wire and Wire Nails.—Shading of $1 a ton on both wire

and nails is reported, and a new list is being expected daily by the trade. There is no change on cut nails. As this is the off season in this line, little new business is being placed. We make the following quotations: Wire nails, carload lots to jobbers f. o. b. cars Pittsburg, are quoted $1.90 base; plain wire, carload lots, $1.80 base; barb wire, carload lots, $2.20 base; staples, carload lots, $2.05 keg. Galvanized, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.75, and less than carload lots, $1.80 f. o. b. Pittsburg, plus freight to points of destination. Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—The market is quiet and lower prices are looked for by the trade. The new business that is being placed is exceedingly light. We make the following quotations: Toe calk, 1.90c; carriage spring steel, 1.75c; tire steel, 1.65c; plow steel, 6 inches and under, 1.40c for Bessemer and 1.40c for open-hearth; plow slabs, ¼ inch and heavier, 1.65c. The demand for shafting on the part of the machinery manufacturers is not heavy, and tonnage has therefore been considerably affected. Drawn and cold rolled shafting is held at 52 percent off in carload lots and 47 off in less than carloads.

Pipes and Tubes.—There has been heavy buying of merchant pipe during the past week, despite the demoralization of the market due to the recent cutting. Demand for line pipe continues heavy, and the mills making the latter are in excellent condition so far as tonnage is concerned. Discounts to consumers, carload lots f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are revised as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼, ⅜ inch	69	59	66	56
½ inch	72	62	69	59
¾ to 6 inch	76	66	73	63
7 to 12 inch	71	61	68	58
Ex. stg., plain ends, ⅛ to 8 in.	68	58	64	54
Double ex. stg., pl. ends, ⅛ to 8 in.	60	50	56	46

BOILER TUBES.

	Steel.	Iron.
1 to 1½ inch	42½	39
1¼ to 2¼ inch	55½	38
2½ inch	58	43
2¾ to 5 inch	64½	50½
6 to 13 inch	55½	38

Old Material.—Not enough old material is moving to establish a market. Dealers continue to stock up at their own prices, but neither mills nor foundries are interested in buying. On heavy melting stock as low as $11 Pittsburg has been quoted.

Coke.—While a few concerns are inquiring for coke for second half delivery, there is very little buying thus far. Producers generally are holding out for $1.45 to $1.50 for strictly Connellsville furnace coke, although it is probable that the price at the last half will be from $1.40 to $1.45. On foundry coke, as low as $1.75 at the ovens has been done to dealers, and $1.85 to $1.95 to consumers. Despite the recent shutting down of ovens in the Connellsville region, the output continues heavy, the production of the week ending Saturday, June 4, amounting to 206,682 tons, while the lower region produced 56,236 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*, 1164 MONADNOCK BLOCK, June 14.

The week past has been a quiet one in local iron and steel circles. New business in nearly all lines is of light proportions, though specifications keep up in good volume. Southern pig iron is now firmly established on the $9 Birmingham basis, and this price is being freely quoted on lots for immediate shipment. Northern irons are without change, $13.50 Chicago for No. 2 being the minimum at which local furnaces will consider any new business. The most important transactions of the week were with rail mills, the Harriman lines having placed orders for 20,000 tons with the Pennsylvania Steel Co., while a Canadian road has bought 10,000 tons from the Illinois Steel Co. The local rail mill is now comfortably filled with business for the balance of the year, and as its specifications are very heavy, one day's mail bringing in 10,000 tons last week, there is no danger of any shut down at this plant this summer. Light rails are in fair demand, but competition is active and some low prices are being made. The demand for plates has improved since our last report, and the South Chicago mill now has a good tonnage on its books for immediate delivery. Sheets are also firmer, several large independent mills reporting that their entire output is practically all taken for the next 60 days. Billets are quiet, the only bookings in this market being an occasional car lot from forging plants. Scrap iron shows no material change from the condition reported last week. There is little demand, and each transaction is closed on its individual merits. Coke is stronger, and $4.65 Chicago is the minimum at which good 72-hour foundry is being offered.

Pig Iron.—Summed up briefly, the local pig iron market is not calculated to arouse much enthusiasm. There is scarcely anything new in the situation except that Southern values are lower. No. 2 foundry is now selling on the basis of $9 Birmingham, or $12.65 Chicago. Northern irons are generally sold at $13.50 Chicago for No. 2 foundry, producers clinging tenaciously to this schedule. There have been some good sized inquiries for Southern irons in the last ten days, but none of them has been placed and it is not expected they will be until the market shows more stability. It is because there is so little bona fide demand that the principal Southern producers have refrained from meeting the $9 competition. Even those furnaces that are selling at this price, and these are limited to one or two isolated stacks, are insisting upon immediate shipment in every instance, and will not consider any proposition for deliveries extending beyond July except at higher prices. With the almost certain possibility of a strike among the coal miners in Alabama and Tennessee this summer, producers of pig iron in those states believe that prices will stiffen and advance rapidly should any disruption occur. In the North there is also the probability of a scarcity of local irons as a result of the tie-up on the lakes, with its accompanying shortage in ore supply. These conditions are not yet a factor in the market and may not become one, but they are there and would be keenly felt should a buying movement of any serious proportions set in. Largely because one may come any day, both Northern and Southern producers are looking at the future with a hopeful eye, while busily engaged trying to prevent the market from further sagging. We have revised our prices, and quote as follows:

Lake Superior Charcoal	$14 50 to 15 00
Northern Coke Foundry No. 1	14 00 to 14 25
Northern Coke Foundry No. 2	13 50 to 13 75
Northern Coke Foundry No. 3	13 25 to 13 50
Northern Scotch Foundry No. 1	14 25 to 14 50
Ohio Strong Softeners No. 1	15 30 to 15 80
Ohio Strong Softeners No. 2	14 80 to 15 30
Southern Coke Foundry No. 1	13 15 to 13 40
Southern Coke Foundry No. 2	12 65 to 12 90
Southern Coke Foundry No. 3	12 15 to 12 40
Southern Coke Foundry No. 4	11 90 to 12 15
Southern No. 1 Soft	13 15 to 13 40
Southern No. 2 Soft	12 65 to 12 90
Southern Gray Forge	12 15 to 12 40
Southern Mottled	12 15 to 12 40
Southern Silveries (4% to 6% Silicon)	14 85 to 15 85
Jackson Co. Silveries (8% to 10% Silicon)	17 80 to 18 30
Alabama and Georgia Car Wheel	18 85 to 19 35
Malleable Bessemer	14 00 to 14 50
Alabama Basic	13 15 to 13 40
Virginia Basic	14 40 to 14 65

Billets.—Except for small orders from forging plants, there is little demand for billets in this market. We continue to quote pool prices for Bessemer and open-hearth, 4 x 4 and larger, up to .25 carbon, $24; up to and including .60 carbon, $1 extra; over .60 carbon, $2 extra. Billets, 3⅞ inches and smaller, and sheet and tin bars, $25. Open-hearth billets from store, $1.30 per 100 lbs.

Iron and Steel Bars.—There is little new demand for either material, though specifications against old contracts are of ample proportions, indicating there is no let-up in consumption. The market on hard steel angles is in a ragged condition and prices are being cut on desirable business, as low as 1.15c having been done. We quote as follows: Bar iron, 1.35c to 1.40c, base, half extras; soft steel bars, 1.46½c to 1.51½c, half extras; soft steel angles, less than 3 x 3, 1.51½c to 1.56½c; hoops, 1.56½c. On lots from store, we quote as follows: Iron bars, 1.75c base, full extras; steel bars, 1.70c to 1.80c, base, half extras; hoops, 2c to 2.10c rates, full extras.

Sheets.—Mills are generally comfortably filled with business for the next two months, and the market shows a firmness it

has not felt in some weeks. This is largely the result of the announcement of the leading producer that it has reduced its schedule to the basis of 2.36½c Chicago for No. 28, a price which all the mills have been making for some months. A good demand has been felt during the past week for both black and galvanized. Prices are unchanged, though some reports say they are being shaded, and we quote as follows: For one pass, cold rolled, blue annealed sheets, mill shipments, Chicago delivery, as follows: Nos. 11-12, 1.86½c; Nos. 13-14, 1.91½c; Nos. 15-16, 2.01½c. On box annealed, one pass, cold rolled, Nos. 18-20, 2.11½c; Nos. 22-24, 2.16½c; Nos. 25-26, 2.21½c; No. 27, 2.26½c; No. 28, 2.36½c; No. 29, 2.51½c; No. 30, 2.61½c. Store prices are as follows: No. 8, 2.10c; No. 10, 2.15c; No. 12, 2.20c; No. 14, 2.25c; No. 16, 2.30c; Nos. 18 and 20, 2.40c; No. 22, 2.45c; No. 24, 2.50c; No. 26, 2.60c; No. 27, 2.70c; No. 28, 2.80c; No. 29, 2.95c; No. 30, 3.10c. On galvanized sheets producers are quoting 80 and 2½ to 80 and 5 percent discount at mill, carload lots; while jobbers' prices on the same product are 75 and 10 percent discount.

Structural Steel.—Contract yards are specifying fairly well, and all seem to have more or less work to do. There are some large contracts pending, but it may be months before they are closed. Jobbers state their business is active, and while their orders are almost all for small tonnages, the aggregate showing is of good proportions. We quote association prices, car lots, mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 2c; beams, 18, 20 and 24-inch, 10c extra; tees, 2.05c rates.

Plates.—There has been a good demand for this product since our last report, and the local mill now has specifications on its books for immediate shipment that will keep its rolls running for several weeks. Prices are unchanged and we quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼-inch and heavier, 1.76½c; flange steel, 1.86½c; marine, 1.96½c; universal mill plate, 1.76½c to 1.81½c; 3-16-inch, 1.86½c; Nos. 7 and 8, 1.91½c; No. 9, 2.01½c; No. 10, 1.91½c; No. 11, 1.96½c; No. 12, 2.01½c. From store, we quote tank steel, ¼-inch and heavier, 2c; 3-16, 2.10c; No. 8, 2.15c; No. 10, 2.15c; flange steel, 2.25c, all f. o. b. warehouse.

Rails and Track Supplies.—The principal contract of the week is that let to the Pennsylvania Steel Co. by the Harriman interests for 19,800 tons of standard sections, all for delivery this year. The local rail interests has also received an order for 10,000 tons of rails for delivery to the Great Northern Railway of Canada. Specifications from other roads are very active, one day's mail bringing over 10,000 tons. Light rails are weak and there is much price cutting among producers. We quote heavy sections, mill shipments, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; light rails, $23 to $25; track supplies, f. o. b. Joliet mill: angle bars, 1.35c to 1.45c; spikes, first quality, 1.65c to 1.75c; track bolts, 3½ x ¾, with square nuts, 2.20c to 2.30c per 100 lbs; with hexagon nuts, 2.35c to 2.45c.

Merchant Steel.—The implement trade is light, and it is expected will continue so until the warm weather is passed. The dullness is a seasonable one, and occurs every year. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2c; sleigh shoe, flat sizes, 1.56½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.76½c base; smooth finished tire, 1.71½c; plow steel, 2.30c and upward, according to quality; toe calk, 2.06½c base. Ordinary grades of crucible tool steel, 6½ to 8c; special tool steel, 12c up. Cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than carload lots.

Cast Iron Pipe.—There is little inquiry for pipe, and transactions are largely of a carload nature. Prices are without change, and we quote 4-inch water pipe, $26; 6 to 12-inch, $25; larger sizes, $24.50; gas pipe, $1 a ton higher.

Merchant Pipe.—The past week was a good one in point of specifications, several large tonnages coming in from different sections of the country. New business remains quiet. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

MERCHANT PIPE.

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ to ⅜ inch	67.35	57.35	64.35	54.35
½ inch	70.35	60.35	67.35	57.35
¾ to 6 inches	74.35	64.35	71.35	61.35
7 to 12 inches	69.35	59.35	66.35	56.35

Less than carloads, 12½ percent advance.
Stove discounts are unchanged, as follows:

Boiler Tubes.—Jobbers report that their customers are specifying freely and that the week's business is of good proportions. Prices are without change, and we quote carload lots, mill shipments, as follows:

BOILER TUBES.

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	43.35	40.35	52.35
1¾ to 2¼ inch	55.35	38.85	40.35
2½ inch	58.35	43.35	43.35
2¾ inch to 5 inch	64.85	50.85	Up to 4 inches.
6 to 13 inch	55.85	88.35	50.85

Wire Products.—Business is dull, though prices are firm and unchanged. The leading interest is considering closing down some of its plants next month for repairs. We quote to jobbers, carload lots, Chicago delivery, as follows: Wire nails, carload lots, $2.10; less than carload lots, $2.15; cut nails, carload lots, 1.91½c base; less than carload lots, 1.96½c; smooth wire, carload, $2, and $2.05 for less than carload lots; galvanized smooth wire, $2.30 in carloads and $2.35 in lesser amounts; painted barb wire, $2.40 carloads, and $2.45 in less than carload lots; galvanized barb wire, $2.70 carloads, and $2.75 less than carload lots. Staples, polished, carloads, $2.25; less than carload lots, $2.30; galvanized, $2.55 carloads and $2.60 less than carload lots. Bale ties, 82½ and 5 percent discount, f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or De Kalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—The coke market is in much the same condition as pig iron. There is not much demand, but prices are firm. Most of the local interests stocked up during the time when demurrage coke was so plentiful and cheap and it will be some weeks before this is worked off. There is little or none of the latter now on track, which has gained strength for the market. Good 72-hour foundry grades from Connellsville ovens are selling from $4.65 to $4.80 Chicago, which is the same prices standard Southern grades are bringing.

Old Material.—Providing the price is right, there is not much trouble in finding a customer for surplus quantities of scrap in this market, but in every instance where a sale is accomplished, the price must be right, and by that is meant, it must be low. There are few inquiries from melters going the rounds; almost all the transactions being in the nature of forced sales. Railroads are reported to be withholding their material because of the low prices offered them by dealers, which action has had a tendency to stiffen the market. We have revised some of our prices, and quote as follows, on gross tons:

Old iron rails	$14 50 to 15 00
Old steel rails (4 feet and over)	11 00 to 11 50
Old steel rails (less than 4 feet)	9 50 to 10 00
Relaying rails, subject to inspection	23 00 to 24 00
Relaying rails for sidetracks	18 00 to 20 00
Old wheels	11 50 to 12 00
Heavy melting steel	9 50 to 10 00
Mixed country steel	7 00 to 7 50

The following quotations are for net tons:

Low phosphorus scrap (.04 and under)	12 00 to 13 00
No. 1 R. R. wrought	10 50 to 11 00
No. 2 R. R. wrought	9 00 to 9 50
Shafting	12 50 to 13 00
Dealers' Forge, No. 1	8 00 to 8 50
Wrought pipe and flues	7 50 to 8 00
No. 1 cast, 150 lb. and less	8 75 to 9 25
Heavy cast	7 75 to 8 25
No. 1 mill	6 00 to 6 50
Country sheet	5 00 to 5 50
No. 1 boilers, cut	7 50 to 8 00
Boiler punchings	9 00 to 9 50
Iron car axles	15 00 to 15 50
Steel car axles	13 50 to 14 00
Iron axle turnings	7 00 to 7 50
Steel axle turnings	7 00 to 7 50
Cast borings	3 00 to 3 50
Mixed borings, etc.	3 00 to 3 50
Wrought turnings	6 00 to 6 50
Machine shop turnings	6 00 to 6 50
Railroad malleable	8 25 to 8 75

Agricultural malleable	7 75 to 8 00
Stove late and light cast scrap	7 25 to 7 75
Old iron splice bars	12 00 to 12 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, June 15.

Extreme dullness still prevails in pig iron, but in finished lines the tone of the market is better, although the buying is largely of the hand-to-mouth kind. The collapse of the strike on the lakes was the principal event of the week.

Iron Ore.—The present week has witnessed the complete breaking of the strike of masters and pilots. There had been no difficulty in getting captains to go to work, but mates were not so easily obtained, as many of them had been hoping to receive appointments as captains. In making contracts with the captains, the policy of the vessel owners nowadays is, as a rule, to consider nine months a full season and pay for the time actually employed. Mates are paid by the month. The leader of the strikers had shown considerable resourcefulness in devising methods of preventing the men from going to their vessels, but he could only postpone the inevitable and Tuesday evening declared the strike off so far as captains were concerned. Arrangements for carrying a few cargoes of ore have been made, but freight rates have not been established. It is expected that shippers will be rather liberal in paying for the carrying of ore during the strike-breaking period. There has been little activity in the ore market, although some furnaces are buying in limited amounts.

Pig Iron.—Very little business is being done and no improvement is expected before July 1, when many contracts expire. Many foundries are running with reduced forces and are not buying, while the few that are busy have contracted for their iron for the first half. In the Valley no trouble would be experienced in placing a large order at $12 for No. 2, although carload rates are occasionally made at $12.25. Local furnaces are selling at $12.75 to $13 for Cleveland delivery. For Southern iron the asking price is usually $9.25, Birmingham, for No. 2, but this is shaded to $9 for a fair order. In spite of the low prices of Northern iron, Southern agents have been able to make some sales. We quote Cleveland prices as follows:

Bessemer	$12 85 to 13 00
No. 1 Strong Foundry	13 00 to 13 25
No. 2 Strong Foundry	12 85 to 13 00
No. 3 Foundry	12 50 to 12 75
No. 2 Southern	12 85 to 13 10
Gray Forge, Valley furnace	11 65 to 11 90
Gray Forge, Southern (Cleveland)	11 85 to 12 00
Lake Superior charcoal	14 25 to 14 50

Finished Material.—Mills report a better demand, especially for structural material, and some jobbers state that their sales from stock are very satisfactory. Specifications against contracts are coming in very satisfactorily and inquiries are more numerous. Light rails are being sold in fair amounts, but competition is keen. Decided improvement is not expected in any line, but there are indications that the summer business will not be as dull as it was feared it would be. On account of the expected closing down of bar iron mils, July 1, orders have been more freely placed this week, and some mills will have all they can do to fill their orders before the time for closing. The official quotation is 1.35c Pittsburg. While this price is often shaded, some of the small producers which named the lowest prices are very slow in making deliveries. Steel bars continue to sell at 1.44½c, Cleveland, for Bessemer, and 1.49½c, Cleveland, for open hearth. There is a fair demand for sheets. It is expected that a considerable number of sheet mills will be shut down July 1 for a few weeks. We quote as follows, Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.74½c; No. 11-12, 1.79½c; No. 14, 1.84½c; No. 16, 1.94½c; No. 27, 2.19½c; No. 28, 2.29½c. Galvanized, mill sales, No. 14, 2.29½c; No. 16, 2.39½c; No. 18-20, 2.54½c; No. 22-24, 2.69½c; No. 25-26, 2.89½c; No. 27, 3.09½c; No. 28, 3.29½c. Out of stock, galvanized sheets, are quoted 75, 10 and 5 off for Nos. 16 to 20 and 75, 10 and 7½ off for No. 22 and lighter gauges. Black sheets out of stock: ¼ in., 1.90c; 3-16 in., 2c. Blue annealed: No. 10, 2.05c; No. 12, 2.10c; No. 14, 2.15c; No. 16, 2.25c. One pass cold rolled: Nos. 18-20, 2.35c; Nos. 22-24, 2.40c; No. 26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 30, 3c.

Old Material.—The market is lifeless and prices have not changed. The shutting down of mills July 1 will probably cause continued dullness in mill scrap. We quote as follows:

Old iron rails	$14 00 to 15 00
Old steel rails (over 6 feet)	12 00 to 13 00
Old steel rails (under 6 feet)	11 00 to 12 00
Old car wheels	10 00 to 11 00
Steel boiler plate	9 00 to 10 00
Malleable iron (railroad)	9 00 to 10 00
Malleable iron (agricultural)	8 00 to 9 00
Heavy steel	10 00 to 11 00

We quote the following net tons:

No. 1 R. R. wrought	$10 00 to 11 00
No. 1 busheling	9 00 to 9 50
No. 1 machine cast	9 50 to 10 50
Iron axles	15 00 to 16 00
Axle turnings	7 00 to 8 00
Wrought turnings (free from cast)	6 00 to 6 50
Grate bars	7 00 to 8 00
Pipes and flues	8 00 to 8 50
Tank iron	7 50 to 8 50
Hoop and band iron	5 00 to 5 50
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 6 50
Stove plate	7 50 to 8 50
Steel axles	13 00 to 14 00
Cast borings	4 00 to 4 50

CINCINNATI.

June 14

The coke market continues easy and dull. Connellsville foundry cokes are quoted at $1.90 to $2 per ton f. o. b. ovens. Other district makes are selling at irregular prices. Furnace coke is relatively as easy as foundry coke. There is very little being done in the way of orders.

Pig Iron.—Current trade comment in the pig iron market shows but little change from conditions which prevailed a week ago. No large inquiries of importance have developed during the week, and the inquiry of an Ohio stove manufacturer already mentioned is still pending. The large agricultural implement maker has not yet placed the order on the inquiry which was noted last week. About the only new inquiry reported calls for 2,000 tons of gray forge for the leading interest in tubes for Pittsburg delivery. Current prices are still on the basis of $9 for No. 2 foundry Birmingham, and $12 at Ohio furnaces, though the latter price might be shaded. The inquiry from melters is still light throughout the territory, and the few transactions that have been made are mainly for small lots. The furnace interests are not urging their offerings, and some Southern makers are refusing to allow their sales agents to quote under $9.25 Birmingham. The Tennessee Coal, Iron & Railroad Co. is reported to be holding for $9.50 Birmingham basis. The sentiment of Southern manufacturers is that at present prices they will decline business for deliveries beyond the third quarter of the year. Advices from Birmingham mention some exports of pig iron during the week, but this movement has not assumed important proportions. Some interest is taken in the labor situation in the South, and it is regarded as not improbable that on July 1 there will be a wage scale difference, and in that event the furnace companies generally assert that they will blow out for 60 or 90 days, as conditions do not justify any advance in wages. The trade generally appears to be in a waiting mood, but if any change at all is noticeable there is perhaps a little more inquiry than a week ago. The following are prices current f. o. b. Cincinnati:

Southern Foundry No. 1	$12 25 to 12 50
Southern Foundry No. 2	11 75 to 12 00
Southern Foundry No. 3	11 25 to 11 50
Southern Foundry No. 4	11 00 to 11 25
Southern Foundry No. 1 soft	12 25 to 12 50
Southern Foundry No. 2 soft	11 75 to 12 00
Gray Forge	10 75 to 11 00
Northern Foundry No. 1	13 65 to 13 90
Northern Foundry No. 2	13 15 to 13 40
Southern car wheel iron	16 25 to 16 50

Finished Material.—The market remains quiet, with the bulk of the odrers simply in quantities to cover current needs. There is no buying for stock, at the same time mills are not urging their offerings. Prices show no change from a week ago. Bar iron is easy at 1.40c f. o. b. Steel bars, 1.48c base, half extras, with dealers quoting 1.75c to 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 to 75, 5 and 2½ percent off. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.35c; No. 14, 2.25c; No. 12, 2.10c; No. 10, 2.05c. Tank plates are dull and sell out of store at 2c for ¼-inch and 2.10c

for 3-16-inch. Beams and channels are quoted at 2c from stock and angles at 1.90c to 2c for base sizes.

In merchant pipe the independent mills are seeking business at concessions, so that the market is easy and at schedule prices it is difficult to effect sales.

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛, ¼, ⅜ inch	67.7	57.7	64.7	54.7
½ inch	70.7	60.7	67.7	57.7
¾ to 6 inch, inclusive	74.7	64.7	71.7	61.7
7 to 12 inch, inclusive	69.7	59.7	66.7	56.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	37.7
1¼ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—The market remains dull and dealers claim prices are but little better than nominal in the absence of trading. On any business offering attractive prices are obtainable. We quote:

Old No. 1 railroad wrought, net tons	$10 00 to 10 50
Cast machine and foundry, net tons	9 50 to 10 00
Old iron rails, gross tons	12 50 to 13 00
Old steel rails, gross tons	9 50 to 10 00
Old short lengths, gross tons	10 00 to 10 50
Old iron axles, net tons	14 50 to 15 00
Stove plate, net tons	6 00 to 6 50
Wrought turnings, net tons	6 00 to 6 50
Cast borings, net tons	3 00 to 3 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., June 14.

President J. C. Maben, of the Sloss-Sheffield Steel & Iron Co., is here to attend the quarterly meeting of his company, which was held in Jersey City today. Mr. Maben says his company has placed a good tonnage so far this month. He does not think prices will go much lower, and believes that the pig iron market will gradually improve as the year draws to a close.

Pig Iron.—There was no change in the local pig iron market during the past week. Business continues to be very dull, with consumers only buying for immediate needs, and invariably in small quantities. While prices remain stationary, the undertone is not strong. Reports from foundries are that trade is very poor, and the outlook for pig iron from this source in the near future is not bright, some sales agents saying that judging from the way orders are being received many foundries have enough iron on stock to last them over the summer. The only inquiries of note reported are one for 1,500 tons from a Central New York agricultural implement concern, and one for 800 tons from a pump interest. Southern irons are in light demand, with $9.25 the highest price quoted for No. 2 foundry at Birmingham. Sales have been made at $9, and a desirable order can easily be placed at this figure. Northern irons have been in slightly better inquiry during the week, but in many cases the increased tonnage placed was largely due to concessions having been granted. Pig iron warrants on the basis of No. 2 Southern foundry are offered at $9 on the Metal Exchange here with no buyers. New York prices at tidewater follow: Northern No. 1 X, $14.75 to $15.25; No. 2 X, $14.25 to $14.75; No. 2 plain, $13.75 to $14.25; Southern No. 1 foundry, $13.25 to $13.75; No. 2 foundry, $12.75 to $13.25; No. 3 foundry, $12.25 to $12.75; No. 4 foundry, $11.75 to $12.25.

Rails.—The Pennsylvania Steel Co. has sold 20,000 tons to the Harriman interests. This is the only contract of note placed this month so far. Trade in small lots, averaging from 100 to 300 tons, is fairly good. The report that Northwestern roads, especially Burlington, are in the market for 35,000 tons, cannot be verified. Burlington purchasers were made some months ago. Standard sections are $28 at mill.

Finished Iron and Steel.—In structural shapes the past week witnessed a little more activity, but contracts closed were for small quantities, and they made a fairly good total. Outside of New England roads being heard from occasionally with small orders, railroads may be said to be out of the market. It is a significant fact that the Pennsylvania railroad has not given any inkling yet as to its requirements for the coming year, although in the past it has generally been among the first to do so. Conditions in bars, sheets and plates are unchanged, new business being very light, while shading of prices in bars and sheets is heard of occasionally. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.35c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; firebox, ordinary, 1.94½c to 2c; refined iron and soft steel bars, 1.49½c; sheets, in carload lots, New York, No. 28 black, 2.35c to 2.40c; galvanized, 3.40c to 3.45c.

Old Material.—Outside of some activity in heavy melting steel scrap and wrought pipe, the old material market is dull, as the demand for other kinds of material is light. Reliable prices are very hard to obtain, and it is not an unusual thing to have dealers' prices vary from $1 to $3 per ton, especially in rails. Many sales being made nowadays are precipitated by a desire to get ready cash, and prices invariably suffer. Sales per gross tons for this city and immediate vicinity might be made by holders as follows:

Old iron rails	$13 75 to 14 25
Old steel rails, long lengths	11 75 to 12 25
Old steel rails, short pieces	10 00 to 10 50
Relaying rails	17 00 to 18 00
Old car wheels	11 00 to 11 50
Old iron car axles	15 50 to 16 00
Old steel car axles	14 00 to 14 50
Heavy melting steel scrap	10 00 to 10 50
No. 1 railroad wrought scrap	11 50 to 12 00
Iron track scrap	10 50 to 11 00
Wrought pipe	8 00 to 8 50
Ordinary light iron	6 50 to 7 00
Cast borings	3 50 to 4 00
Wrought turnings	5 50 to 6 00
No. 1 machinery cast	10 00 to 11 00
Stove plate	8 00 to 8 50

PHILADELPHIA.

June 14.

It is daily becoming more apparent that the restriction of production of pig iron is not sufficient to keep within the demand. Furnaces are piling their iron and the market shows little indication of life. Conditions in the finished material market are not much more favorable than in pig iron and, on the whole, the outlook is discouraging.

Pig Iron.—Prices show little change, but there are evidences of weakness and the market is extremely dull. Southern irons are being sold on a $9 basis Birmingham, and there are reports of even lower prices. Northern irons are held at $14.50 to $15, delivered, for No. 2 X. Demand has not been strong enough to test the market. We quote: No. 1 foundry standard brands, $15.25 to $15.50; No. 2 X foundry standard brands, $14.50 to $14.75; No. 2 foundry plain brands, $14 to $14.25; gray forge, standard brands, $13.50 to $13.75; gray forge, ordinary, $12.75 to $13; Southern No. 2 X foundry, $13.50 to $14; Southern No. 2 X on dock, $12.75 to $13.

Finished Material.—Only small orders are being placed and they are not numerous, but prices are pretty well maintained. We quote: Best refined bar iron, 1.48½c to 1.55c; tank plates, steel, 1.73½c; angles, 1.50c to 1.55c; beams, channels for 15 inch and over, 1.73½c.

Old Material.—Prices are still tending downward and sales are few. Prices are about as follows: No. 1 steel scrap, $11.25 to $11.75; low phosphorus scrap, $15.50 to $16.50; old steel axles, $15 to $16; old iron axles, $17 to $17.50; old iron rails, $14.50 to $15.50; old car wheels, $12 to $12.50; choice railroad No. 1 wrought, $13.50 to $14; machinery cast, $12 to $13; No. 2 light scrap (forge), $10.50 to $11; No. 2 light scrap (ordinary), $9 to $10; axle turnings, $9.50 to $10; wrought turnings, $9.25 to $9.75; cast borings, $6.50 to 6.75; stove plate, $9 to $9.50; wrought iron pipe, $10 to $11.

BIRMINGHAM, ALA.

BIRMINGHAM, Ala., June 13.—Some little improvement is noted in the pig iron demand in the Southern territory, the Sloss-Sheffield Steel & Iron Co. announcing that its sales during the last of the past week amounted to more than 19,000

tons, while inquiries on hand today call for more than double that amount. Other companies report a little impetus to the trade. The curtailment in the production in the North and Northwest is said to have something to do with this little improvement, as also a fear that there is likely to be some curtailment in this district. There has been some iron sold in the export market, several hundred tons of iron being started from Birmingham last week for the United Kingdom. The statement is made that inquiries are being made for reasonable freight rates and freight room in ships, the intention being to ship a large quantity of iron abroad while the American market conditions are quiet. As to prices, a few hundred tons of iron sold during the past week in this district above $9.25 per ton, though that price is given as the common quotation. Some sales have been made in the Birmingham district as low as $9 per ton. The production in this section is still holding up well. A few furnaces are out for repairs, but two furnaces are booked to go into blast within the next thirty days—one at Thomas and one at Battelle.

R. Preston Means, president and general manager of the Means-Fulton Iron Works, with plant at North Birmingham (machine shops and foudnry), has sold his interests to R. C. Rickert, of Portsmouth, Ohio, an experienced iron man. The latter is moving to this district and will take charge at once.

Much interest is taken in the conference appointed for this week in New York between the Tennessee Coal, Iron & Railroad Co., the Sloss-Sheffield Steel & Iron Co., and the Republic Iron & Steel Co., to discuss the report of the commission of experts as to the values of ore and coal lands belonging to the three companies. The idea of a consolidation between the interests named is scoffed at in this section.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., June 14.

Pig Tin.—With bearish interests operating in London and heavy arrivals here, together with the advent of the time when the demand always falls off, the metal market has been very weak since our last report, closing prices today being the lowest for the present year. In the trade the belief is that the market is shaping itself for dullness and lower prices. Today's closing at the Metal Exchange follow: Spot, 25.75c to 26.25c; June, 25¾c to 26⅛c, and July 25½c to 26c. London's closings today follow: Spot, £118 10s; futures, £117 15s. Arrivals for the month to date aggregate 2,225 tons, with 1,739 tons afloat.

Copper.—There has been a further reduction of ⅛c to ¼c in the "official" prices for all grades since we last quoted them. This shows the condition of trade, which seems to grow more quiet weekly, and with the outlook for the immediate future anything but encouraging. The London market has been dull and lower. Closing prices today follow: Lake, 12⅝c to 12¾c; electrolytic, 12½c to 12⅝c; casting, 12⅛c to 12¼c. London's closing today follow: Spot, £55 12s 6d; futures, £55 11s 3d. Exports for this month to date amount to 4,530 tons.

Lead.—The leading interest today reduced its price on 30-day shipments from 4.25c to 4.20c. Spot is easy at 4.25c to 4.35c. St. Louis is weaker at 4.10c. London is slightly higher at £11 10s.

Antimony.—Both Cookson's and Hallett's are selling at 7¼c, and other brands at 6¼c.

Quicksilver.—We quote $45 per flask of 76½ pounds in lots of 100 flasks. London is £8.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, June 14.

The metal market continues quiet in this city, and while prices are stationary, they are weak. Demand is limited to small lots for immediate shipment. Lake is quoted 13¼c for carloads, and 13⅝c for less than carload lots; casting, 12⅞c for carloads and 13⅛c for smaller quantities. Pig tin is weak at 28c to 28½c, according to quantity. Spelter, 4.90c to 5c in car lots, and 5½c to 5¾c in lesser lots. Sheet zinc, 6.20c, car lots of 600-lb. casks, and 6.45c in less than car lots. Pig lead, 4.30c in car loads, and 4.35c to 4.60c in lesser amounts.

Old metals are quiet in sympathy with the new product. We quote as follows: Copper wire and heavy, 11c; copper bottoms, 9¾c; copper clips, 11c; red brass, 9⅝c; yellow brass (heavy), 7½c; yellow brass borings, 6c; red brass borings, 7⅝c; light brass, 5¾c; pipe lead, 3.60c; tea lead, 3¼c.

Foundry Foremen's Club of Cleveland.

A number of foundry foremen of Cleveland met in the offices of the Cleveland Founders' Association, at 407 Superior building, Friday evening, June 10, for the purpose of forming an organization to be known as the Foundry Foremen's Club. A. M. Loudon, foundry superintendent of Abendroth Bros., Port Chester, N. Y., who was returning from the convention of the American Foundrymen's Association at Indianapolis, stopped off and attended the meeting, giving the foremen an interesting talk on foundry foremen's clubs, outlining policy, formation, etc., and suggesting that the Cleveland foremen join the Associated Foundry Foremen, which is the national body, and then form their local organization afterward. Thos. M. Roche, secretary of the Cleveland Founders' Association, also addressed the meeting, the foremen tendering both Mr. Loudon and Mr. Roche a vote of thanks. The following persons left their names with Secretary Nicholls for certificates of membership in the national body: Thos. Finucan, John Lewis and James Reilly, Westinghouse Electric & Mfg. Co.; Charles Olsen, Johnston & Jennings Co.; William Kerr, Chisholm & Moore Mfg. Co.; H. L. Hott, Interstate Foundry Co.; Charles J. Rath, Fulton Foundry Co.; P. D. McDonell, Fanner Mfg. Co.; Harry Hoover, Cleveland Steel Castings Co.; Chas. Ahrens, Bowler Foundry Co.; Wm. H. Nicholls, Hill Clutch Co.; Chas. Dickinson, Macbeth Iron Co.; M. Cahill and John McGlynn, City Foundry Co.; John Hirsch, W. S. Tyler Co.; Hugh Mackenzie, American Ship Building Co.; John Ryan, Kilby Mfg. Co.

Continuous Steel Mill at South Sharon.

Work on the erection of the new continuous sheet mill of the American Sheet & Tin Plate Co., South Sharon, Pa., will shortly be commenced. The mill will consist primarily of eight stands of rolls, and will be a modification of the continuous tin plate mill in operation at the Monongahela plant of the South Side, Pittsburg, the same ideas being carried out, with the exception that this mill will be adapted to the rolling of sheets instead of black plates for thinning purposes. As in the continuous tin mill the roughing is to be done by the continuous machinery, while the finishing will be done by hand. The equipment will consist of a continuous heating furnace, continuous roughing mill of six stands, automatic matcher, continuous mill of two stands with tables and automatic doubler. Between each stand of rolls are conveying tables for passing the sheets from one stand of rolls to another. The cost of rolling sheets will be very materially reduced, the present cost of hot rolling alone being $9.37 a ton for 28-gauge.

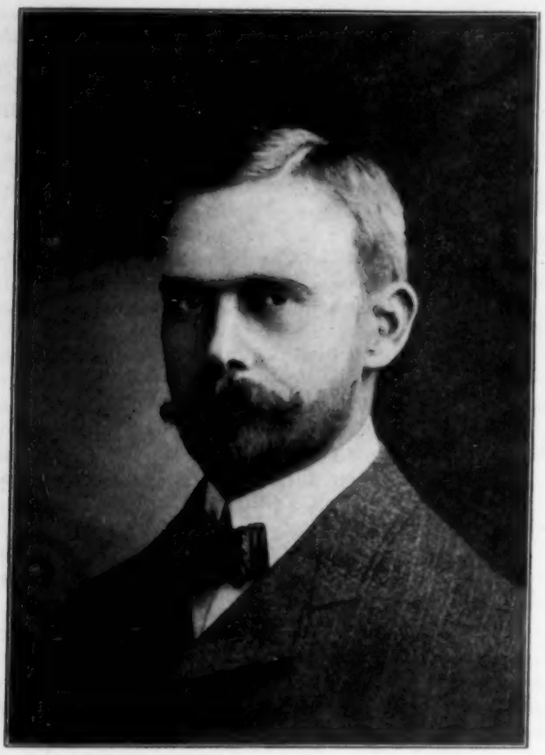
At the annual meeting of the Zenith Furnace Co., of Duluth, owning the Zenith blast furnace and by-product ovens, the following were elected directors: W. L. Brown and C. J. Wheeler, Chicago; A. B. Wolvin, A. M. Marshall, C. A. Duncan, A. D. Davidson, C. W. Andrews, Duluth. These re-elected the former officers: A. B. Wolvin, president; C. W. Andrews, vice president; J. L. Washburn, secretary. The company's large coking plant will go into operation about July 1 and the furnace soon after. The latter will make about 250 tons daily. It will be blown in on a Bessemer mixture.

The St. Louis exhibit of the C. W. Hunt Co., of New York, is in the court of the Palace of Electricity. The company shows an electric storage battery locomotive and cars running on narrow gauge "industrial" tracks, with curves and switches of 12 feet radius.

The Riverside Iron Works Co., Kansas City, Mo., will at once begin rebuilding its pattern shop, which was recently burned.

THE NEW PRESIDENT OF THE A. F. A.

Chris J. Wolff, the newly elected president of the American Foundrymen's Association, is the second vice president of the L. Wolff Mfg. Co., Chicago, manufacturer of plumbing specialties and supplies, and is superintendent of the company's works at Hoyne and Carroll avenues. He was born in Chicago and is 43 years old. All his working life has been spent with the concern with which he is at present connected. He entered the factory as a boy and worked through its different departments until he fully mastered the business in all its details. Mr. Wolff is a thorough foundryman, not



CHRIS. J. WOLFF.

only having spent a number of years working on the floor, but having also studied chemistry in its relation to foundry practice, and gained a diploma therefor.

Lake Superior Meeting of Mining Engineers.

Announcement is made that the 87th meeting of the American Institute of Mining Engineers will be held in the Lake Superior iron and copper regions, beginning at Duluth on Wednesday, Sept. 14. It has been the expectation that the Lake Superior Mining Institute wold arrange to have its annual meeting at the same time, but official announcement has not yet been sent out. For the American Institute of Mining Engineers the following itinerary is proposed: Saturday, Sept. 10: Leave Buffalo in the evening by the steamship "Northwest," of the Northern Steamship Co. Sept. 14 and 15: In Duluth, leaving by rail in the evening of Sept. 15. Sept. 16 and 17: On the Mesabi range. Sept. 18 (Sunday): In Duluth, leaving at night. Sept. 19, 20 and 21: In Houghton and vicinity, leaving at night. Sept. 22: At Ishpeming, Mich., leaving at night. Sept. 23: In Chicago.

Members who desire to visit the St. Louis Exposition can go from Chicago to St. Louis at once or remain a day or two in Chicago. A session of the institute will probably be held at St. Louis on Sept. 26. The International Engineering Congress, arranged by the American Society of Civil Engineers, is in session at St. Louis Oct. 3-8.

The Findlay Mfg. Co., of Findlay, O., has purchased the old plant of the Van Buren, Heck & Marvin Co., and expects to conduct a foundry business. The new company is composed of Messrs. S. F. Fields, C. F. Spiece, Ed. C. Taylor, D. H. Thomas, Jas. Steen and others.

SLAG DISPOSAL IN THE PITTSBURG DISTRICT.

The Carnegie Steel Co., Pittsburg, has organized a slag department, which disposes of this product instead of permitting each furnace to dispose of it in its own way as heretofore. The question is becoming more serious daily in the Pittsburg district, as in no other district in the world is as much slag produced every 24 hours. The Carnegie Steel Co., with its large number of furnaces, not only at Pittsburg, but at Sharon, New Castle, Mingo Junction and Bellaire easily produces 6,000 tons of slag daily. A large portion of this is being used for filling purposes, while the railroads are hauling away a large amount for ballast, and a very small portion of that made is now being used in concrete work and for fireproofing purposes. The latter field is being developed by the steel company, as a fair revenue is already assured and the field is bound to grow owing to the difference in price between the broken slag and crushed stone. For concrete work the steel companies are now receiving about 10 cents a ton for crushed slag, the slag crushing itself where machine made, thus making no additional cost. Slag sand is also being made at the furnaces of one of the Pittsburg steel plants which is to a large extent to replace river sand and sells to the trade at from 40 to 50 cents a ton.

Nearly all the slag produced at the Edgar Thomson, Carrie and Duquesne furnaces of the Carnegie Steel Co. is being used for filling in the vicinity of Duquesne, where an extensive hollow is being filled, the property having been purchased for the purpose of providing a deposit for this material for years in the future. However, the increase in the blast furnace capacity in the past few years has resulted in the production of more slag than was at first estimated, with the result that the hollow is fast filling up and other disposition of this material must be made. The railroads that have been making extensive improvements in recent years are not using much slag at present, owing to the cutting off of many extensions and they are becoming more particular about the nature of the material they are taking from the furnaces. One large road refuses to take the granulated slag, produced by running the molten slag into pits partly filled with water, preferring the broken slag produced by the slag machines. The day is not far distant when the railroads will demand a nominal price for disposing of this material, and when their requirements for improvements are still further reduced the furnace operators will be compelled to develop the fields the Carnegie Steel Co. has started on, while the cement industry promises to be an outlet to a greater extent than at present.

Electric Power for Mesabi Range Ore Roads.

Plans of the Great Northern Power Co., of Duluth, have been financed, and work on the water power development of the St. Louis river at Duluth will commence at once. This is the company that proposes to equip the iron ore roads running between the Vermillion and Mesabi ranges to the head of the lake with electricity for the handling of all trains. The scheme has not been definitely settled as yet, but may be in the course of a reasonable time. The company will, however, furnish power for uses about the head of the lake, and will probably transmit power to many of the mines of the Mesabi. Its initial development will be for 30,000 h. p., and it is proposed to increase this as required to a total of considerably more than 100,000 h. p., which is available at the rapids. These rapids have a fall of more than 500 feet, and a drop of 365 feet will be had through the pipe line of the company, from an open canal at the head of the cliffs to the river below. From a 70-ft. dam further down the river the company will develop sufficient direct hydraulic power to permit the operation of one of the largest pulp and paper mills in the United States, negotiations for the erection of which have been on for some time.

According to official reports to *Construction News* permits were taken out in 25 of the principal cities of the country during the month just closed for the construction of 9,435 building improvements aggregating a total cost of $33,961,233, against 7,487 buildings at an estimated cost of $34,811,856 for the corresponding month a year ago, an increase of 1,948 buildings and a decrease in cost of $850,623, or about 2 percent.

FISCHER HYDRAULIC-PNEUMATIC RIVETER.

A hydraulic riveter operated by steam or compressed air through the medium of an intensifier, is shown in the illustration below. The intensifier consists of two cylinders, one placed above the other. The lower or larger cylinder is connected with the source of power, the air tank or steam boiler, while the upper or smaller cylinder filled with water is connected with the riveter cylinder. The piston rod of the lower cylinder forms the plunger for the upper cylinders, so that when the pressure is admitted to the lower cylinder its piston rises forcing the water from the upper cylinder into the riveter cylinder at a pressure which is increased above the pressure of the steam or air in the proportion of the areas of the intensifier, piston and plunger.

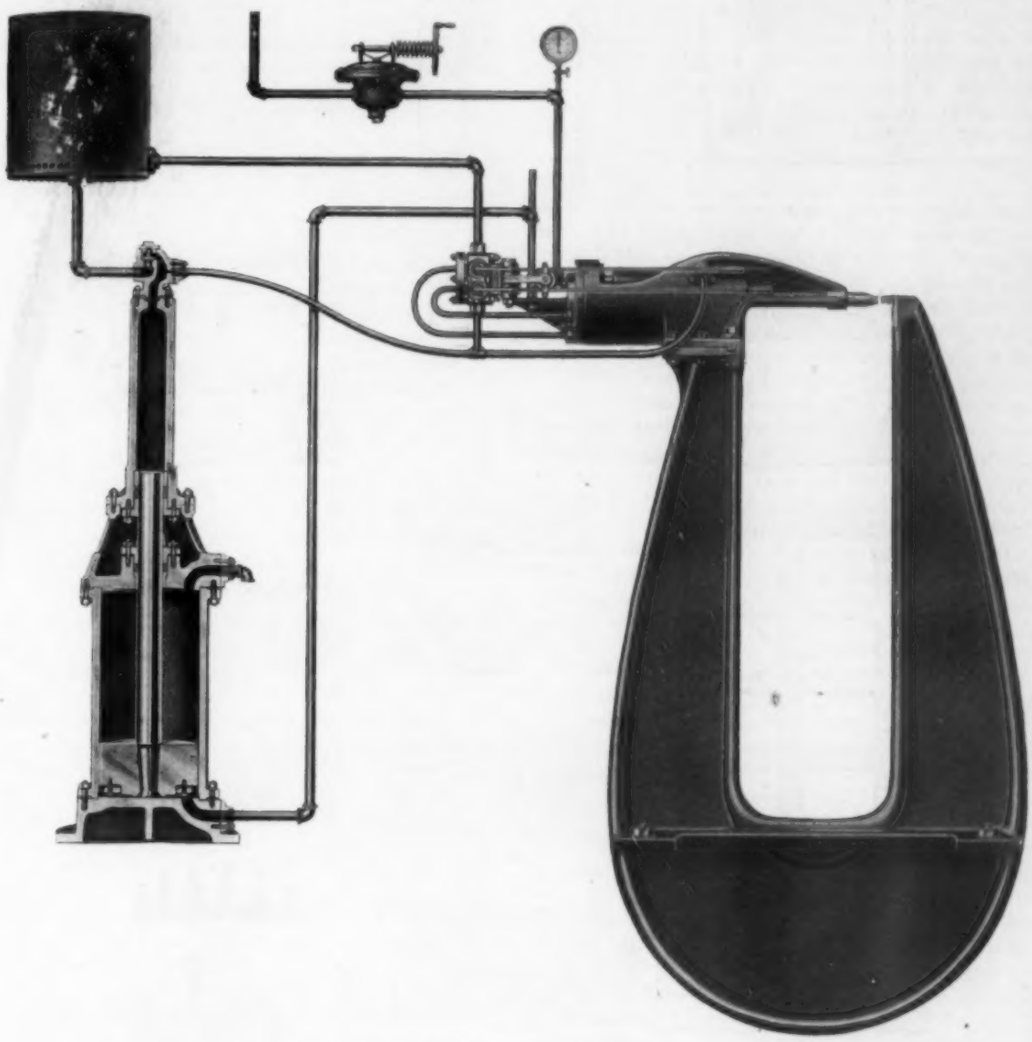
One stroke, not necessarily a full stroke, of the intensifier produces a complete cycle of operations of the riveter, namely: To advance and secure the plate holder, in case one is used; to advance the riveter die and form the rivet head, and finally to return both riveter and plate holder dies to their original position.

The valve arrangement is such that these operations are controlled by one movement of each of two levers, in case the plateholder is used, and one movement of one lever, in case the plate holder is omitted. The levers are returned to their original position automatically in either case.

A water tank at a suitable elevation is connected with both the upper intensifier cylinder and the riveter cylinder, in such a way that any waste from either cylinder is automatically supplied and the column of water from the tank to the intensifier cylinder, from the intensifier cylinder to the riveter cylinder and from the riveter cylinder back to the tank, is maintained intact. Further, the hydraulic head of the water in this tank is utilized in performing the idle movements of the different parts.

Between the air tank or steam boiler and the lower intensifier cylinder there is placed a regulating valve by means of which the pressure under which the rivet is formed and consequently the power consumed in forming the rivet is controlled and adjusted approximately to the size of the rivet, resulting in economy in power consumed. In so far as the fluid in the riveter is used over and over again oil or glycerine may be substituted for water, preventing freezing in cold weather and providing at the same time an efficient lubricant for all packing.

By the use of a single riveting cylinder any pressure between maximum and minimum can be secured instantly by adjusting the hand wheel on the regulating valve. This eliminates a large number of details with the attendant expense of maintenance. Another advantage is that the power consumed is directly in proportion to the size of the rivet driven. The riveter with its intensifier constitutes a complete installation exclusive of pumps, accumulators and the more or less extensive hydraulic installation.



HYDRAULIC-PNEUMATIC RIVETER.

These riveters togethers with a line of standard stationary and portable riveters are built by the Fischer Foundry & Machine Co., of Pittsburg.

A. M. Mills has been elected a director of the Salisbury Steel & Iron Co., Utica, N. Y., to fill the vacancy caused by the death of Titus Sheard. Arrangements have been made by this company to erect a new blacksmith and powerhouse, and institute compressed air for drilling purposes. The directors have also decided to erect a concentrating plant. The reports submitted at the recent meeting are said to have been very satisfactory.

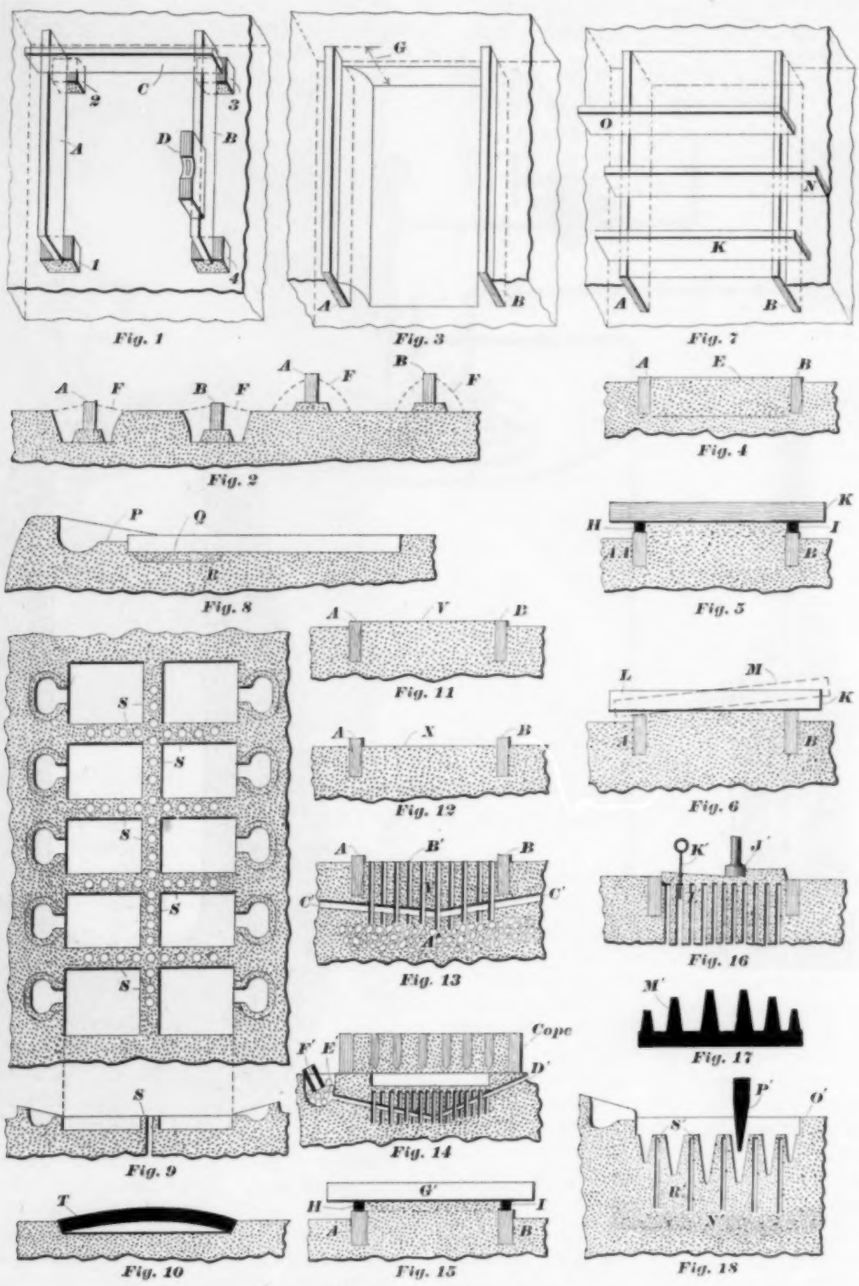
STANDARD METHODS FOR GREEN SAND BEDS.*

BY THOS. D. WEST, SHARPSVILLE, PA.

The importance of having standard methods of making green sand beds was first brought out by the writer at the meeting of the New England Foundrymen's Association, in November, 1903, in a paper entitled, "The Bottom of a Green Sand mold." This paper was of such interest to that society that a committee of three was appointed to bring the matter before this convention for some definite action of permanent value to the industry.

beds, to say nothing of the many slip-shod methods that are followed, the average experienced molder who knows but three or four ways of doing such work, must concede that there is something yet to learn in the business of making perfect castings. It is a well known fact that there are few molders who will make beds for the same class of work in the same way. It is also well known that there are improper as well as proper methods followed, the former causing many defective castings, and often heavy losses which might have been avoided had there been standard and systematic plans to follow.

There are two kinds of beds used in a large number of



STANDARD METHODS FOR GREEN SAND BEDS.

In order that I may aid this committee by presenting systems for consideration as standards, I have thought that a treatise showing what my investigations and experience could offer might not only prove of value to our members, but also impress the general trade with the importance of standards for making beds, at the same time showing the great extent of the subject which can and should be thoroughly systematized.

When it is stated that there are over 30 ways of making

*Read at the Indianapolis convention of the American Foundrymen's Association, June, 1904.

foundries. Generally speaking, one is called a soft bed, and the other a hard bed. The former is used for making "open sand castings," or without a cope, while the latter, as a rule, must be the bottom of a closed mold. In making either soft or hard beds, means must be provided to give any form that may be desired. As a rule a bed has a plane level surface. Should a bed be used for open sand castings it is necessary that it be perfectly level, otherwise the castings will be thicker on one side or end than on anotner. By placing a cope over a bed conditions may prevail which force metal to run up hill, and hence castings of even thickness can be obtained on beds

made out of level, which it would be impossible to make on "open sand" beds. Hence the importance of correct work in leveling beds for open sand castings.

Leveling Straight Edges to Make a Bed.

The first requisite in making a true bed is a true level. Then we require three straight edges as seen in Fig. 1, two of which, A and B, are true on one edge, while the third, at C, is true on both edges, and each parallel with the other. In starting to level up the straight edges to make a lever bed, it may be necessary to set them in the floor as on the left, or on top as on the right of Fig. 2. In any case A and B should have their ends resting on sand mounds, as at Nos. 1, 2, 3 and 4, in order that either end may be pressed down to obtain a true level, without danger of rocking, as would be the case if the sand were under the middle. The first to be leveled is A, after which B is set on the sand mounds 3 and 4, as near to the level of A as the eye can judge. This done, C is set on the top edge of A and B near one end, and then brought to a level by either building up more sand under the end at No. 3, or by pressing it down into the mound. The end at No. 3 agreeing with the level of the end at No. 2, the level D is then placed as shown, and the end of B at No. 4 brought to a level of Nos. 1, 2, and 3. Sand is now filled in the vacant space between the mounds under the straight edges and tucked up with the fingers to get it all as solid as this can make it. Should the straight edges be in the ground or above it, as on the right and left of Fig. 2, sand is then filled in on the sides and rammed to be in keeping with the form shown by the dotted lines F. In doing all this, after leveling the straight edges, there is a liability of getting them out of true, and hence to be assured that everything is correct, the straight edges are releveled, and parts found high are pressed down by knocking on a flat piece of wood placed on the upper side of the straight edge, to preserve it from abuse. Some may lift the low end up and try to shove sand under it instead of knocking the high side down, but this will not leave as solid a bed under the straight edge as knocking them down. This must be done in such a manner that the bedded straight edges A and B will not rock. This is avoided by pounding down the middle with the last blows.

Making Soft Beds.

Soft beds are generally labor savers. Their use obviates ramming and venting. There are few, if any, castings made on soft beds that cannot be made on hard ones, were these but thoroughly vented. In making a hard bed a rammer or the feet are used, whereas with a soft bed only the palm of the hands, a flat body, or the edge of a straight edge is employed, the latter being the one most often used. The hardness obtained is all on the surface of the bed, while a hard bed is generally softest on its face, the underlying material being more solid and often as hard as can be made by ramming.

The hardness of the face of a soft bed is generally regulated by the pressure of the palms of the hands, flat board, etc., or the thickness of what is called "knock-down pieces," which range from ⅛ inch to ⅝ inch as the circumstances may require. A scheme of the sizes is seen in Table 1.

After leveling the straight edges as seen in Fig. 1, in commencing a bed that is below the floor level, as on the left of Fig. 2, we have a view something like that seen in Fig. 3, which shows sand dug out between the straight edges A and B for the required depth, as at G. This space is now all filled in with nicely tempered or ½-inch riddled sand and struck off to appear like E, Fig. 4, being careful that the sand is placed in loosely without pressing it down in any manner. Sand is now riddled on through a No. 4 sieve evenly all over the surface of the bed, to a depth of ¼ inch to ¾ inch, as may be required. Or the sand having been riddled on the floor is shoveled on to such a height as may be found practicable. This done, "knock-down" pieces H and I are placed on the straight edge A and B, as seen in Fig. 5, after which a straight edge is placed on top of H and I as shown at K, and a man at each side holding the straight edge in one hand and the knock-down piece in the other, together pull both along the top of A and B, carrying off the surplus sand that projects above the level of the tops of H and I. It may require two or three strike-off operations to obtain a full smooth surface, as the first pulling drags the sand, and often leaves unfilled sections in the bed that must be filled in with sieved or riddled sand, and which (to become even with the other portions) must be struck off with the strike, as suggested above.

The surface having been struck off, it remains to be pounded down to the level of the tops of A and B. This operation is illustrated by Fig. 6, and is done by first removing H and I, and then with a man at each end of K alternately lifting up one end 3 inches to 4 inches, and pressing it down while the other is held stationary; the dotted line, showing how the new depressed end at L will be lifted, as at M, in its turn to pound down the raised sand. As each end is lifted, it is carried on an angle as far as it can go before its end would be off the straight edge to let it be pressed below the level of the bed.

In selecting knock-down straight edges, they should be taken sufficiently stiff or deep to keep them from bowing in the center while being used. If this occurs it causes the center of the bed to be higher than the outer portions, and hence not be a leveled bed unless carefully struck off. The depth of the knock-down straight edge should not be under 4 inches for beds under 24 inches wide and for every foot increase in width, the depth of the straight edge is increased 1 inch. For a bed ten feet wide, this would call for the knock-down straight edge 12 inches deep. In thickness they range from 1 inch to 1½ inches, and as the depth increases so should the thickness.

Granting that a knock-down straight edge leaves a bed true in its width, it may even with the best of care leave some irregularities or ridges on its face due to the action of one knock not covering another sufficiently to prevent marks being left on the face of the bed. There is much work for which sleeking over these marks with a trowel will allow a bed to be used without further striking off; but where the quality of the work demands the most perfect bed that can be produced, it is necessary to strike it off after knocking it down. In doing this, the strike is given a forward see-saw motion, one that causes the strike K to be pulled on a slight angle to one side of the bed as at N and then back to the other as at O, Fig. 7. Care should be taken to always have every movement a forward one, for should the strike be allowed to go backward at any time, this would cause the bed at that point to be marked, or to have a slight depression that did not exist in other portions.

The objection to merely pulling the strike K in a straight and forward direction, is the great liability to tear up, or make a rough face on the bed, which could be the cause of scabs or rough castings. After the bed has been all struck off it may be a little rough, where coarse sands are used. In such cases a thin covering of sand, not more than 1-16 inch thick, can be sieved or spread over one end of the bed, and then by starting at this end, it can be see-sawed off for a final finish.

Where the knock-down pieces have been over ¼ inch thick, the trowel can often be used to give a good finish to the bed surface, and this may often be assisted by first spreading on with the hand a very slight scattering of fine sieved sand over the surface of the bed. With knock-down pieces thinner than ¼ inch the surface of the bed is so soft that there is much danger in the sleeking operation depressing it at spots, and thereby causing an uneven surface on the mold's face of the casting.

Regarding the size of the knock-down pieces to be used for a given piece of work, no rigid rule can be given. This depends largely upon the character of the castings to be made and the kind of sand used. For the same cross-sections, one having a coarse grade of sand might use a ½-inch knock-down piece, whereas with fine sand ¼-inch or ⅛-inch pieces only might be required.

By using the thickest knock-down pieces for coarse grades of sand, and the thinnest for the finer varieties, other conditions being equal, the depth for soft beds given in table 1 could be adopted for making open sand castings ranging from ½ inch to 3 inches in thickness. The thinner the castings the thinner the knock-down pieces to be used, as a rule.

It is to be understood that by using the depths of beds or loose and given in Table 1, no venting of any character is required, but where it is practical to lay ¼ inch vent rods 3 inches to 4 inches apart on the solid ground to reach under the entire bed and put 1 inch to 2 inches of sand over them before shoveling loose sand to fill in the bed, the depth given

in table 1 could be decreased 25 percent for the smallest bed, to 40 percent for the largest one. Some may drive the vents sufficiently deep under the surface with one vent wire after a bed is made, to not disturb its face, thinking to thereby save the labor of digging out deep beds, or laying down a large number of ¼ inch vent rods as per the above. This, however, is not to be recommended, as there is much danger of the soft sand filling up the vent holes when the wire is withdrawn, and thereby shutting off the intended escape of gases and causing the metal to bubble and boil, with consequent poor castings.

The greatest difficulty in using soft beds lies in the liability of the metal leaving the runner at P to cut and wash away the soft sand fronting it at Q, Fig. 8. In beds above 4 feet square it is generally a good plan to cut out a portion of the bed fronting the runner P for a depth of about 2 inches above R, and then fill this up with all new, or facing sand, packed down with the palm of the hand to the consistency of a hard bed. After this the part in question is vented with an ⅛-inch wire downward and below with a ¼-inch wire to catch their gases. The top of the cut-out portion R is then struck off and finished to correspond with the adjoining level. This allows the portion fronting the runner to stand very rough usage when pouring large plates, and gives them as smooth a surface at this point as is obtained over the general face of an open sand casting. Where this method is adopted very coarse grades of sand can be used for the balance of the bed other than that fronting the runner, which is very desirable for making large plates.

It often occurs that a molder may wish to make a number of fair sized plates on a floor area that will necessitate having a partition of but 3 inches or 4 inches between edges of the plates, as seen at S, Fig. 9. In such cases it is generally advisable to run down a ¼ inch to ⅜ inch vent wire between edges, as seen by the holes shown, because if this is not done, the plates poured last may draw the gases from some that have been poured and thereby raise the center body of the plate casting while in a semi-molten state, making it appear something like the one seen at T, Fig. 10. The above work of down-venting may be avoided by having extra depths of loose sand under the face. Nevertheless, there are cases where it is well to follow the above practice of venting the partitions between plates.

The temper of any sand forming the face of the plate mold, be it open or closed, should be worked as dry as practical. In making plates over 1½ inches thick it may often be necessary to use a facing sand in order to assist the dusted blacking, or graphite, to peel them. In using any facing sand over the general bed it is put on the thickness of the knock-down pieces H and I, a plan which insures its being of even thickness all over the bed. As a rule facing sand is not used on open sand plates unless they are over 2 inches thick. Blacking, graphite, soap-stone, or lime, dusted over the face of any all-common sand beds will generally peel entirely, when under 2 inches thick, unless it be the body fronting the runner, where a little facing sand can be used, as shown at Q, Fig. 8, to help the blacking, etc., to peel the casting. Then, again, a good coat of these materials fronting the runner, may often answer the purpose of facing sand at this point, providing that there is not too large a body of metal washing over it. The safest plan, however, is to use facing sand as described above, and shown, at Q. Fig. 8, in connection with the blacking, etc.

The metal to run open sand castings should be very fluid and with good life, as dull, sluggish metal cannot give good open sand plates. Because plates may be made in open sand, there is no reason why one can be careless or slovenly about it. It is as creditable to make good open sand work as the closed, and in many cases more so.

Method of Testing the Hardness of Beds.

In obtaining the weight necessary to penetrate beds ½ inch, as given in the above tables, the hardness tester exhibited by the writer before the New England Foundrymen's Association, Nov. 11, 1903, was used. This device was illustrated in the following journals: *The Iron Trade Review*, Nov. 12, 1903; *American Machinist*, Dec. 3, 1903; *Journal* of this Association, January, 1904; *The Foundry*, January, 1904; London *Engineering*, Jan. 8, 1904, as well as other publications.

In making the hardness tests given in Table 1, a nowel 4 inches deep, 12 inches square was filled with loose sand, passed through a No. 8 sieve, and struck off with knock-down pieces H and I varying from ⅛ inch to ⅝ inch in thickness, as seen by the bed numbers 1 to 9, in Table 1. After each bed of soft sand was struck off and knocked down, the hardness tester was placed on the bed and six impressions made, the average of which was taken as the weight given in the third column of Table 1.

The hardness tests for Tables 2 to 4 were made in the same 4 by 12-inch nowel, as above, the only difference being that the sand was rammed hard up to 1 inch, ¾ inch and ½ inch, respectively, of the top edge. Sand was then passed through a No. 8 sieve, shoveled on, and struck off with the respective knock-down pieces. All of which is shown in tables 2 to 4.

By using care to pull steady at an even speed, one test will agree remarkably close with another, especially when all the sand is used sieved. The tests given show the relative hardness obtained under similar treatment with identical conditions, and what we would expect from the use of different thicknesses of knock-down pieces in general practice.

The only other matter, aside from the above precautions, that can cause any noticeable difference in taking tests as given in tables 1 to 4, in different shops, is a variation in the dampness of temper of the sand used. This difference, at the worst, is very slight, and not sufficient to affect the tests to any extent that would be harmful. The system can be used to give an intelligent control on the part of the manager or molder in obtaining any desired degree of hardness in molds never possible heretofore. Should it be desired to omit the hardness tester, this will not impair the value of the systematic methods that are present here for beds of different character.

How to Designate Kinds of Beds.

In designating the kind of bed wanted, in the case of soft or semi-hard beds, one will refer to both the bed number and the initial. With soft beds, instead of citing No. 1, A, it might be No. 1, D, or any other of the initials of Table 1, for the reason that the depth of sand is not always to have its face pounded down with the same thickness of knock-down pieces H and I, as the area of the bed generally regulates its depth.

In designating semi-hard beds treated at the close of this paper, one will, in citing the number of the bed which represents the thickness of the knock-down pieces, also give the

TABLE 1. SOFT BEDS FOR MAKING OPEN MOLD CASTINGS.

Bed No.	Thickness of knock-down pieces H. & I.	Weight to penetrate bed ½-in.	Initial with equivalent in inches to designate depth of tempered sand in a bed.		Initial with equivalent to designate area of a bed.
1	⅛-in.	4 oz.	A— 5 in.	J—14 in.	S— 2 ft. sq.
2	9/64 "	6 "	B— 6 "	K—15 "	T— 3 "
3	¼ "	9 "	C— 7 "	L—16 "	U— 4 "
4	11/64 "	12 "	D— 8 "	M—17 "	V— 5 "
5	⅜ "	15 "	E— 9 "	N—18 "	W— 6 "
6	13/64 "	1 lb. 2 "	F—10 "	O—19 "	X— 7 "
7	½ "	1 " 5 "	G—11 "	P—20 "	Y— 8 "
8	17/64 "	1 " 9 "	H—12 "	Q—21 "	Z— 9 "
9	⅝ "	1 " 13 "	I—13 "	R—22 "	AA—10 "

TABLE 2. HARD BEDS FOR MAKING OPEN MOLD CASTINGS.

Bed No.	Thickness of knock-down face X.	Thickness of knock-down pieces H. & I.	Weight to penetrate bed ½ inch.	Thickness of castings that can be made on the respective beds.
10	1 in.	⅛ in.	8 oz.	½ in.
11	1 "	9/64 "	1 lb. 0 "	¾ "
12	1 "	¼ "	1 lb. 8 "	1 "
13	1 "	11/64 "	2 lb. 0 "	1¼ "
14	1 "	⅜ "	2 lb. 9 "	1½ "
15	1 "	13/64 "	3 lb. 3 "	1¾ "
16	1 "	½ "	3 lb. 15 "	2 to 6 "

TABLE 3. HARD BEDS FOR MAKING CLOSED MOLD CASTINGS.

Bed No.	Thickness of knock-down face X.	Thickness of knock-down pieces H & I.	Weight to penetrate bed ½ inch.	Thickness of castings that can be made on the respective beds.
17	¾ in.	⅛ in.	1 lb. 6 oz.	½ in.
18	¾ "	9/64 "	1 lb. 14 oz.	¾ "
19	¾ "	¼ "	2 lbs. 7 oz.	1 "
20	¾ "	11/64 "	3 lbs. 3 oz.	1¼ "
21	¾ "	⅜ "	4 lbs. 6 oz.	1½ "
22	¾ "	13/64 "	6 lbs. 4 oz.	1¾ "
23	¾ "	½ "	8 lbs. 2 oz.	2 to 6 in.

TABLE 4. HARD BEDS FOR MAKING CLOSED MOLD CASTINGS.

Bed No.	Thickness of knock-down face X.	Thickness of knock-down pieces H & I.	Weight to penetrate bed ½ inch.	Thickness of castings that can be made on the respective beds.
24	½ in.	⅜ in.	4 lbs. 4 oz.	½ in.
25	½ "	7/16 "	5 lbs. 0 oz.	¾ "
26	½ "	½ "	6 lbs. 0 oz.	1 "
27	½ "	9/16 "	7 lbs. 4 oz.	1¼ "
28	½ "	⅝ "	9 lbs. 0 oz.	1½ "
29	½ "	11/16 "	10 lbs. 8 oz.	1¾ "
30	½ "	¾ "	12 lbs. 6 oz.	2 to 6 in.

initial that represents the depth and the area of the bed desired, all of which is given in Table 1.

In the case of the hard beds, Tables 2 and 4, treated in the following pages, different conditions prevail than with the above beds, and these are such that it is only necessary to call for the number of the bed to designate just what is desired.

While there are thirty different kinds of beds in the four tables given, they all differ sufficiently to cause the skilled and intelligent molder to make a selection, and thus get the one that is best every time he is called upon to make a different job. This will undoubtedly put aside the impression existing in the minds of many, that any old thing will do in the foundry.

Making Hard Beds.

There is less uniformity in the practice of making hard than soft beds, for this reason there is special need of standard or systematic methods to make them. Hard beds are necessary where a mold is covered with a cope, as this creates a heavy pressure not met with on the face of the open sand cast mold. Were one to pour an open sand plate made bed with a cope on it, the casting would come out much thicker than its pattern, especially in the center body, which means an untrue casting.

The conditions demanding certain degrees of hardness in the face and under body of a hard bed will depend upon the speed of covering a bed with a body of metal, or pouring, and the pressure that will be brought upon it when the mold is filled with metal. As a rule, the face of a hard bed should be much softer than the under body. It is only in cases where the bed is covered rapidly and a heavy pressure brought upon it, say inside 5 to 7 seconds, that it is safe to have the face of the bed so hard that it requires a pull of 20 pounds to penetrate it ½ inch. There is work that will require even a harder face or higher pull than this.

By having a system we can regulate the question of hardness to obtain any degree desired. A system that could be adopted universally is illustrated in Figs. 11 to 15. Here at A and B, straight edges are leveled on the plan shown by Figs. 1 and 2, for making soft beds. This done, sand is filled in and rammed up solidly to the top, as seen at V, Fig. 11, after which a strike is used to lower the rammed body below the level of the straight edge to a depth of ½ inch to 1 inch, as may be desired, to appear as at X, Fig. 12. Up to this level the degree of hardness desired is regulated by the power upon the rammer, and may be rammed so hard that it is difficult to penetrate it with a vent wire. In no case, however, must venting be omitted in this body, and as a rule the harder the ramming, the closer and more the venting required.

In venting the body Y is shown between the straight edges A and B, Fig. 13, the vent wire is driven down to the cinder bed as at A'. These vents should not be over 1½ inches apart, and make a vented bed appear something like the surface at B'. Where cinder beds are not employed as in A' then it becomes necessary to connect the down vents B' with under vents as at C'. These under vents may not be driven until after the bed is completed, straight edges pulled out, and the cope rammed up ready for lifting off. In many cases these under vents may be brought up to the joint of the mold as at D, Fig. 14. Then, again, a recess may be made in the floor and filled up with fine coke as at E'. After this the recess and coke are covered up with sand and the vent brought to the surface with gates as at F', or vents driven from the floor's level down to the coke.

Returning to the subject of compression or ramming of the sand, we are carried back to Figs. 12 and 13. Here the distance between the face at X and B', respectively, and the top of the straight edges A and B, is to be made or rammed in a manner to carry the molten metal without bubbling or boiling. The bed having been vented as at B', Fig. 13, the first operation is to close up the top of the vent holes by rubbing the palm of the hand over them. This done, sand (which may be a facing sand in the case of heavy plates or special light work) is shoveled on, to project ¼ inch to ¾ inch above the top of the straight edges and then struck off with knock-down pieces H and I and a strike G', as at Fig. 15, after the manner given for making the face of soft beds. The thickness of the knock-down pieces H and I, and the depth of the rammed face, which is the thickness of sand ranging from the bottom at X to the top of the straight edges A and B, Fig. 12, is what regulates the hardness of the face of the bed. The less the depth at X the greater the thickness of the knock-down pieces, the harder the body forming the face of the bed.

Hard beds are used for open sand plates as well as covered ones. This is found advantageous in the case of plates, etc., having lugs, flanges, or projections on them that would require solid bodies of sand around them, and more or less finishing of these parts of the mold with tools. In using hard beds for open sand castings, those of Table 3 having the thickness of the knock-down face but ¾ inch, are often preferable to those of Table 2, as this brings the vented face up nearer to the face of the mold and gives a bed that is not as hard as those of Table 4. A point must be specially remembered in this connection, and that is the necessity of closely venting the whole body under the knock-down face, and also the importance of avoiding the use of very fine grades of sand for this surface. Where shops have trouble with fine sands, bank, shore, or other sharp sand could be mixed with the fine molding sand. This matter can also oftentimes be helped by using thinner knock-down pieces for the respective thickness of casting than shown in the last column of Table 3, as for example in making a plate 1½ inches thick, the 3-16 inch instead of the ⅜-inch knock-down pieces could often be used, and in designating the bed number, one would merely order No. 18 instead of No. 21 to be used.

It is not expected that by presenting all this material it will avoid the necessity of using brains. Far from it. What is given is intended to be a help, and by following the principles advanced much benefit will result.

Aside from the methods shown in Figs. 11 to 15, and the three tables for making hard beds, we have the butted face bed. This class of beds is made by first ramming up to the level of the top of the straight edges A and B, as at V, Fig. 11, and then striking it down from ½ inch to 1 inch, according to the depth of good common or facing sand required, as at X, Fig. 12, after which the body is closely vented, as at B', Fig. 13. This all done, the top of the vent holes are all closed with the palm of the hand and riddled sand shoveled on and struck off as at G', Fig. 15. The depth of the pieces H and I, Fig. 15, should be fully 1¼ times that of the struck out depth A, Fig. 12. After the common, or facing sand, is struck off, the butt end of the rammer is used as at J', Fig. 16, in a way to ram down the face in a regular even manner to obtain any degree of hardness desired, such as may range from requiring beds as hard as Nos. 26 to 30, seen in Table 4, and which in the case of very hard beds may call for a pull of 25 pounds. In butt ramming such a surface, care must be exercised not to miss a spot and to avoid going over the same place twice. The butting all completed, an ⅛-inch vent wire K' is used all over the face to drive vent holes into the main body 4 inches to 6 inches deep, so as to have the face gases find relief through the body vents which will connect with the cinder bed A' or under vents C', as at Fig. 13. It is to be understood that one is not expected to have K', Fig. 16, find a vent hole every time it is driven down as at L'. If K' never struck an under vent L', the gases will be able to escape to the under vents L by reason of the porosity of the sand, which in its body between the under vents, if these are not over 1½ inches apart, will give good freedom for the escape of surface gases.

The surface venting finished, the face of the butted bed is struck off smooth in a see-saw manner, after which sand is sieved or scattered on sparcely over the surface with the hand, and then rubbed down with a smooth hard wood block about 2 inches thick and about 3 by 8 inches. This surface is in turn sleeked over with the trowel, and the bed is finished.

In venting butted faces or beds, some will dispense with the use of the second vent wire K′, and vent direct from the butted face, down to a cinder bed A′, or under vent C′, with a large vent wire, and then stop up the top of the large holes left with the point of the finger. This is objectionable for the reason that finger poking can close the tops too far below the surface and should any be missed or not closed tightly, the melted metal could escape to the cinder bed under the vents, thereby causing boiling, scabs, or a "blow-up."

Semi-Hard Beds for Prickered Plates.

The most difficult class of work for which to construct beds, is the making of plates used by the molder to carry hanging bodies of sand or loam. These call for prickers which in some cases are very long. At M′, Fig. 17, is seen a long prickered plate, and to cast this successfully, if long, requires careful manipulation to prevent the center of the bed from lifting or blowing when being cast. The difficulty lies first in the necessity of having the bed soft enough to admit of driving long prickers into the sand and at the same time not so soft that the pressure at the bottom of the prickers, when pouring the plate, can strain sufficiently at the bottom to lift up part or the whole center body of the bed. Second, in the excess of gases created by reason of the long prickers often more than doubling the area in which to create gases than would come from a flat plate. Many molders have failed to consider this point, and when pouring the casting, are surprised at finding what metal did not go into bodies of scrap went skyward.

In making long prickered plates it is generally the safest plan to place a cinder bed under the mold, as at N′, Fig. 18. After the cinder bed is in place, nicely tempered sand, dry as can be worked, and riddled through a ½-inch or No. 2 riddle, is shoveled into the hole in about 4-inch courses at a time, until within about 6 inches of the face. These courses are pressed down with the palm of the hands, or by securing boards about 6 by 12 inches to the feet and walking over the soft sand, as one would with snow shoes on soft snow. To tramp about without such boards would make the bed too hard. The last 5 inches of the depth of the bed is made after the system of making soft beds and which includes selecting the number of knock-down pieces, also the initials to designate the depth and area of beds, as given in Table 1.

The bed made and side O′, Fig. 16, formed, the next operation is knocking down the pricker patterns P′, of which there should be four or six, so that the knocking down of one pattern cannot burst the sand through to any holes or prickers that have been formed by the withdrawal of a pattern. When all of the pricker patterns are in the bed, the space between them is closely vented with an ⅛-inch vent wire from the face of the bed down to the cinders, as at R′, care being taken to avoid placing any vents so near to a pricker pattern as to permit the metal to burst through to them and thereby run into the cylinders, filling the space for release of gases. A few of these leaks can make conditions so bad that it would have been better to have had no venting or provision to carry off the gases made in the beds at all. In venting between the prickers the tops of the vents will require to be stopped up by pressure of the finger, and after filling the depression with sand, the body is sleeked over with the trowel. In doing this part of the work, care should be taken to close the top of every vent hole and also not to make the surface any harder than the knock-down prices used would leave it.

A point, a little aside from the subject of this paper, but well to refer to here, is the danger of metal cutting in front of the runner, especially in large prickered plates. To prevent this the surface fronting the runner is best made entirely of new or facing sand, after the plan at Q, Fig. 8, and as an extra precaution should be surface nailed. Then again, it is best to make the runner where it passes the metal to the mold fairly broad, as a narrow runner at this point confines all the cutting action of the metal within a narrow space, thereby giving a chance for injury to come quicker than would otherwise be the case.

The Sloss-Sheffield Steel & Iron Co. broke its own record during the month of May, when its furnace output was 36,518 tons, with six of its seven furnaces in operation. The greatest prior output for six furnaces was in April, when the company made 34,968 tons.

THE ALLIS-CHALMERS CO.'S REPORT.

The annual report of the Allis-Chalmers Co., which passed its preferred dividend for the fourth quarter of the fiscal year ending April 30, shows there was a surplus for the year, after allowing for three preferred dividends, of only $99,499. These figures compare with a surplus in 1903 and 1902 of $516,076 and $304,759, when the full 7 percent rate was paid on the preferred stock.

Following is a condensed comparative statement of the operations of the company for three years:

	1904.	1903.	1902.
Net profits	$952,624	$1,653,576	$1,442,259
*Dividends	853,125	1,137,500	1,137,500
Surplus	$99,499	$516,076	$304,759

* These figures contain only three quarterly payments on the preferred stock.

Following is the balance sheet and the profit and loss account of the company on April 30, 1904, with statements showing the net profits for the fiscal year ending that date, and the provisions made for all known contingencies that may result in losses upon business carried over into the new year, but exclusive of the results of the business of the Bullock Electric Mfg. Co., recently acquired. No comparison can be made of the figures contained in the balance sheet, as the current one has been prepared along somewhat different lines from that issued a year ago:

ASSETS.

Capital assets: Real estate, buildings, plant, machinery, good will, etc.		$30,246,084.59
Current assets:		
Bills and accounts receivable	$3,437,519.95	
Stocks of merchandise, material and work in process (less payments on account) at factory cost, not exceeding present market values	2,914,878.42	
The Bullock Electric Mfg. Co. of Ohio for working capital, and an interest in the Allis-Chalmers-Bullock Ltd. of Canada	463,000.00	
Cash	1,060,113.11—	7,875,511 48
		$38,121,596.07

LIABILITIES.

Capital liabilities:		
Preferred stock*	$16,150,000.00	
Common stock	19,820,000.00	
		$35,970,000.00
Current liabilities:		
Accounts payable	$1,014,395.75	
Mortgage on Norwood Foundry, due March 22, 1905	34,000.00—	1,048,395.75
Funds:		
Depreciation reserves		478,364.75
Surplus		624,835.57
		$38,121,596.07

* Dividends at the rate of 7 percent per annum cumulative from February 1, 1904.

PROFIT AND LOSS.

Balance at April 3, 1903, as per last annual report		$820,835.57
Net profits for the fiscal year ending April 30, 1904, after deducting all expenses of manufacturing and selling, and after making provision for depreciation of plants and for possible bad debts	$952,624.08	
Less three quarterly dividends paid on preferred stock, amounting to 5¼ per cent	853,125.00	
Balance of net profits, constituting the surplus for fiscal year		99,498.08
Excess of par value over book cost of $100,000 preferred stock and $180,000 common stock of the company acquired in settlement of current business contracts and since cancelled		201,951.07
		$1,122,285.72

Special appropriations have been made for the following purposes:		
For cost of licenses, patents, experimental construction and installations in connection with gas engine, steam turbine, and electrical departments, and for special expenses and depreciations	$201,951.07	
For possible losses on existing contracts, and further shrinkage in present value of materials and supplies	99,499.08	
For reduction in the cost of work in process to present basis of value	196,000.00—	497,450.15
Surplus, as shown in balance sheet		$624,835.57

The meeting of stockholders for the purpose of electing five directors to succeed those whose term of office will expire 1904, and for the transaction of such other business as may properly come before the meeting, will be held Sept. 8. In the settlement of several business contracts entered into prior to March last, the company became the owner of $100,000 par value of its preferred stock and $180,000 par value of its common stock, which shares, by authority of its board of directors, have been canceled, thus reducing the outstanding capital stock to $16,150,000 of preferred stock entitled to cumulative dividends, at the rate of 7 percent per annum, from Feb. 1, 1904, and to $19,820,000 of common stock.

In his report to the stockholders President B. H. Warren says: "After a most careful consideration of the various changes that have taken place in the methods recently introduced in Europe and this country for the development and utilization of power, the board of directors decided to establish departments for the manufacture of gas engines, water and steam turbines and electrical machinery. The investigations, experimental construction and negotiations involved in the thorough consideration of these subjects, both at home and abroad, have continued during the past two years with the purpose of adopting only such systems as have been proved commercially the most economical in construction and maintenance and the most efficient in operation."

President Warren then refers to the acquiring of the right to manufacture and sell in the United States, Canada and Mexico of the Nurnberg gas engine, and in those countries, with special privileges, for Central and South America and Africa, of the turbine of the Turbine Advisory Syndicate of England. The taking over of the Bullock Electric Mfg. Co. is also mentioned.

Horace F. Ruggles, 106 Wall street, New York, has secured contracts for about $100,000 worth of sugar machinery for shipment to Cuba.

ST. LOUIS EXHIBIT OF THE SHELBY STEEL TUBE CO.

In the automobile section of the Transportation building at the St. Louis World's Fair is a unique exhibit by the Shelby Steel Tube Co., of Pittsburg. It consists of a booth,

FIG. 1.—BOOTH OF THE SHELBY STEEL TUBE CO. IN THE TRANSPORTATION BUILDING.

made of 2-inch tubes on the side, with a center support of 4-inch tubes 22 feet in length. A feature of the exhibit, illustrating the variety of shapes which have already been developed commercially in the seamless tube industry, is a table top made up from about 3,500 pieces of tube enclosed in a steel frame 6 x 4 feet. Reproductions are given in the accompanying cut of both the booth and the table top.

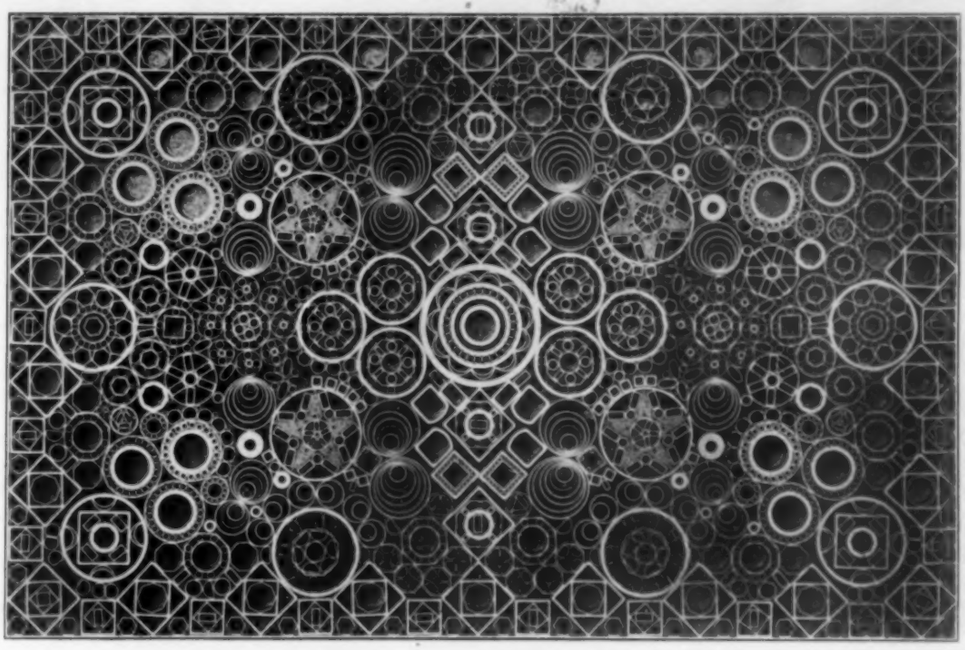
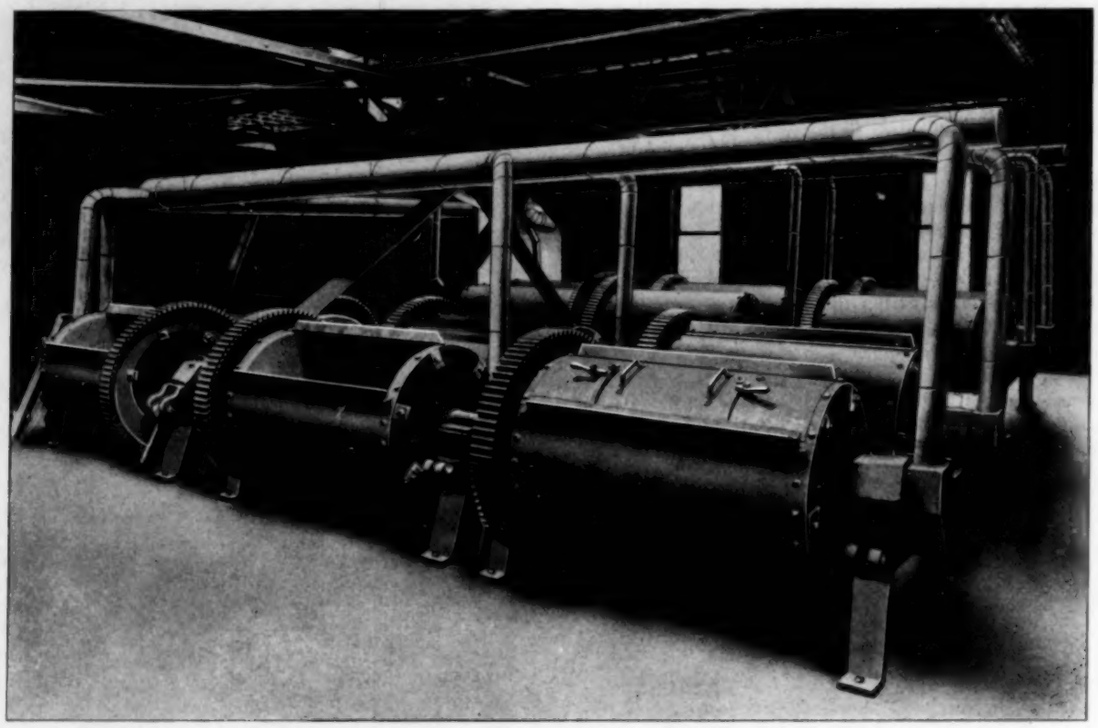


FIG. 2.—TABLE TOP IN THE EXHIBIT OF THE SHELBY STEEL TUBE CO. MADE FROM SECTIONS OF TUBES.

The Cleveland Electric Railway Co. has ordered 500 steel ties to be experimentally used in laying tracks in the city of Cleveland.

EXHAUST MILL FOR CLEANING CASTINGS.

An exhaust cleaning mill for foundries is shown in the illustration, being after the design of the Reliable Foundry Co., of Quincy, Ill. The group of these mills shown is installed in a stove foundry. The exhaust system is the special feature of these mills. A four-inch pipe leads from each of the mills to a larger main pipe. At the junction of the various individual pipes with the main pipe a suction fan is placed, and thus the dust from the inside of the mill is drawn away and deposited at the outlet of the main pipe at any determined part of the building or yard. The journal of the outside head of the mill is hollow and to it is fastened a dust box with which the exhaust pipe connects. Small castings and particles of iron are kept out of the pipe by, means of a perforated plate of semi-steel, the same diameter as the mill, placed on the inside against the head and securely bolted on. The bearings are all accurately turned and babbitted and the barrel evenly balanced; thus a battery of mills, as shown in the cut, may readily be run with 5 horsepower. When used in batteries the mills are so geared that by means of a lever any one or any number of mills may be put in operation without any inconvenience to workmen engaged on the still mills.



RELIABLE EXHAUST CLEANING MILL.

The barrels are made of extra heavy boiler steel, securely riveted and tightened to prevent loss of slugs. They are fitted with double heads on both ends. The doors are readily opened and closed, though trebly locked and made so as to prevent the waste of iron often attending tumbling operations. The sizes are 24, 30 and 36-inch diameters, any length desired.

On an execution for $122,875, issued by the Fidelity Trust Co. of Philadelphia against the Chickies Iron Co., the sheriff sold the real estate of the corporation, near Marietta, Pa., at public auction, to W. U. Hensel. The price paid was $5,000 subject to a mortgage of $100,000.

The trustees of the bankrupt New York Car Wheel Works began proceedings in the bankruptcy court at Buffalo on the 10th inst. to have set aside the claim of the North American Trust Co., of Philadelphia, for $96,000, which had been allowed by the referee in bankruptcy, being a balance due the trust company upon notes given by the defunct car wheel works originally, aggregating $150,000. The contention of the trustee is that the notes were given by the car wheel works without valid consideration, as accommodation notes and covered indebtedness of the P. H. Griffin Machine Works to the Trust company and not the debts of the car wheel works, P. H. Griffin being owner of the machine works and president of the car wheel works. The referee in bankruptcy refused to set aside the claim upon the facts presented and the case was adjourned to enable the trustees to secure and submit further proofs.

Lake Superior Corporation.

The stockholders of the Lake Superior Corporation, which is the reorganized Consolidated Lake Superior Co., met in New York, June 9, and elected the following officers and board of directors: President, Charles D. Warren, of Toronto; vice-presidents, Charles E. Orvis, of New York, and Thomas J. Drummond, of Montreal; treasurer, John T. Terry Jr., New York; directors, Francis B. Reeves, Philadelphia; J. Tatnall Lea, Philadelphia; John T. Terry, New York; Dumont Clarke, New York; George B. Turrell, Orange, N. J.; F. H. Clergue, Sault Ste. Marie; Charles R. S. Hinchman, Philadelphia; N. W. Rowell, Toronto, and Edward Q Trombridge, New Haven. The president of the new company is the president of the Traders Bank of Toronto. Mr. Clergue was president and general manager of the Consolidated Lake Superior Co. A check for $1,000,000, to be used as working capital, was paid into the treasury of the company at the meeting.

Another bill in equity has been filed at Pittsburg to annul the merger of the Keystone Car Wheel Co., of that place, with the National Car Wheel Co., the late consolidation of the leading car wheel plants of the country. William P. DeArmit brings this action on behalf of himself and other stockholders, and charges of collusion and fraud are made. DeArmit says he is owner of 165 shares of the capital stock of the Keystone Car Wheel Co., and further that prior to May, 1903, a scheme for the merger of the Keystone company and seven other companies manufacturing car wheels was formulated. By agreement all of the companies were to submit sealed estimates and verified statements of assets, sales, gross and net, and these were not to be opened unless all the companies complied with the arrangement. It is alleged that a combination was formed irrespective of the terms of this agreement and the court is asked to annul the agreement between the companies. The Keystone Car Wheel Co. was capitalized at $200,000, while the National Car Wheel Co. has a capital of $9,000,000.

Indianapolis Meeting of the American Foundrymen's Association.

After a very successful meeting, the Indianapolis convention of the American Foundrymen's Association came to an end Thursday noon, June 9. This was earlier than had been arranged for, the program having provided for sessions in the afternoon and evening of that day, but, owing to the desire of the Pittsburg contingent, as well as of a number of members from other cities, to visit St. Louis before returning to their homes, it was decided to wind up the convention with the morning session. No meeting was held in St. Louis, as was at first talked of. The determination to shorten the hours of the convention necessitated several changes in the program. The election of officers and the transaction of new and unfinished business, set for Thursday evening, was taken up Wednesday evening at a meeting preceding the smoker and concert given by the Indianapolis Commercial Club. Several papers that were down for reading at the sessions Thursday, and those left over from Wednesday, were read by title only, and discussion on them invited in writing, while the sessions that were to have been devoted to the interests of foremen patternmakers and foundry accountants were condensed into the reading of the principal paper on each subject and short talks on the desirability of forming affiliated bodies of foremen patternmakers and foundry accountants along the lines adopted by the foundry foremen and metallurgists.

New Officers.

The officers and district vice presidents elected for the coming year are given below:

President, C. J. Wolff, of the Wolff Mfg. Co., Chicago.

Secretary and treasurer, Dr. R. Moldenke, Watchung, N. J.

Vice Presidents—First District, E. W. Anthony, Smith & Anthony, Boston; Second District, John Mills, Abendroth Bros., Port Chester, N. Y.; Third District, D. J. Thomas, Starrett & Thomas Foundry Co., Pittsburg; Fourth District, A. K. Beckwith, Est. of P. B. Beckwith, Dowagiac, Mich.; Fifth District, H. E. Diller, Western Electric Co., Chicago; Sixth District, T. J. Sheriffs, Sheriffs Mfg. Co., Milwaukee; Seventh District, J. P. Golden, Golden Foundry & Machine Co., Columbus, O.; Eighth District, T. J. Best, Warden, King & Co., Montreal, P. Q.

The auditing committee was reappointed without any change.

With the exception of Messrs Beckwith, Golden and Best, all the district vice president are serving their first term. The retiring president, Mr. Willis Brown, of Erie, Pa., was made an honorary member. The office of assistant secretary, filled last year by H. E. Field, was abolished. The nominating committee which drew up the foregoing list was composed of the following persons: John Magee, Wm. Yagle, H. E. Diller, J. P. Golden, and C. H. Thomas.

The Foundry Foremen's Section held its business session and election of officers Thursday morning. The report of the secretary showed that the membership had been nearly doubled since the last annual meeting, and that the society had a balance of over $50 in the treasury after paying off an indebtedness of $80 existing at the time of the Milwaukee meeting. The following officers were elected to serve for the coming year:

President, C. H. Thomas, Hay Foundry & Iron Works, Newark, N. J.

Vice President, David Reid, Rarig Engineering Co., Columbus, Ind.

Secretary, F. C. Everett, J. L. Mott Iron Works, New York City.

Treasurer, James Murphy, Lane & Bodley, Cincinnati, O.

Vice Presidents—Erie District, W. Gruneau, Erie Engine Works, Erie, Pa.; Milwaukee District, T. Glasscock, Pawling & Harnischfeger, Milwaukee, Wis.; Chicago District, David Spence, Greenlee Foundry Co., Chicago; New York District, S. M. Williams, A. & F. Brown, Elizabethport, N. Y.; Indianapolis District, W. H. Holmes, American Foundry Co., Indianapolis.

Before their adjournment the foundry foremen appointed a committee to prepare memorial resolutions as a tribute to Henry Hansen, late editor of *The Foundry* and organizer of their association. A committee of three, consisting of A. M. Louden, James Murphy and F. C. Everett, will have the matter in charge, and the resolutions are to be engrossed and presented to the widow of Mr. Hansen.

The Metallurgical Section elected R. S. MacPherran, of the Allis Chalmers Co., Milwaukee, chairman; and H. E. Diller, of the Western Electric Co., secretary.

Before adjournment, the president of the American Foundrymen's Association appointed William H. Parry, of the National Meter Co., Brooklyn, N. Y., chairman of a committee to be selected by himself, with instructions to sound the foremen patternmakers on the subject of forming an organization similar to the foundry foremen and affiliating with the parent association.

In like manner and for the same purpose, John Magee, of the Magee Furnace Co., Boston, was made chairman of a committee, the other members of which are to be selected by himself, to organize the foundry accountants.

Other important work was undertaken by the association for the coming year. Besides co-operating with the American Society of Testing Materials in the preparation of standard specifications for foundry pig iron, it discussed and passed resolutions asking the latter body to take up the question of standardizing foundry coke. The association also appointed a committee to co-operate with the Department of Mines and Metallurgy at the St. Louis Exposition in the tests that are to be made at the Exposition foundry and government coke plant of all the coking coals of the country. It is also working on a system of pattern insurance, co-operating with the National Board of Fire Underwriters in this matter; and has appointed a committee to investigate and classify the hardness of molds and to establish the proper standards of measurements.

TUESDAY AFTERNOON.

In our last week's report we gave a synopsis of the president's address and the secretary's report. The whole of Tuesday morning was given over to registration, sight-seeing, etc., actual work not commencing until the afternoon. The committee reports and memorials disposed of, the paper prepared by Thomas D. West, on "Standard Systems for Making Green Sand Beds" was taken up. Mr. West read it in synopsis only, showing his hardness tester and calling attention to the tables in the paper. A number of persons took part in the discussion of the paper which followed. Later in the day a memorial was presented by John Magee, representing the New England Foundrymen's Association, requesting that the A. F. A. appoint a committee "for the purpose of investigating and classifying the hardness of molds; to establish the proper standards for their measurement, and to list such classes of work as shall seem desirable, showing the most suitable degree of hardness for the body of the mold in each class of work." The president appointed the following members to serve on this committee: Thomas D. West, chairman; E. B. Gilmour, J. A. Murphy, C. H. Thomas, Arch. M. Louden, and David Reid.

The report of the committee on the Standardizing Bureau stated that the demand for samples in the past year had exceeded its ability to supply them. It had about 100 orders in hand for sample "C," which had been in preparation about a year and which was expected to be delivered in the next few weeks. A new sample "D" was being made. The accounts of the bureau to date, showed collections amounting to $2,006.16; expenses, $1,054; accounts receivable, $102. Drillings on hand, "A," 37½ pounds; "B," 129 pounds, and "D," 11 pounds.

J. S. Seaman, Pittsburg, made the report of the committee on Foundry Trade Schools. Mr. Seaman told the society of the project under way at Pittsburg made possible through the liberality of Mr. Carnegie and the Pittsburg municipal authorities for the erection of free technical schools for instruction in all the mechanical arts. He said that a site of 32 acres adjoining Schenley Park had been purchased and that the work of grading for the buildings had begun. The Pittsburg foundrymen had waited on Professor Hammerschlag, the managing head of the institution, and discussed with him the plans for the erection of a large and complete foundry in connection with the schools, as well as the subjects on foundry work for instruction.

Pattern Insurance.

The committee on Insuring Patterns reported that during

the year it had held conferences with representative insurance interests, and that it had presented a series of propositions to the National Board of Fire Underwriters for their consideration. These propositions were read before the society. In view of their importance we print them herewith in full:

Memoranda Submitted to the Insurance Interests.

(1) The value of a pattern for record purposes shall be the actual cost to the owner.

(2) That in view of the fact that some patterns are active, some semi-active, others are used for emergencies ohly, and still others are entirely obsolete; and a division into these desired classes for equitable valuation becomes too much a matter of individual and interested views; the insurance valuation be fixed by an annual depreciation charge on the record cost.

(3) That the depreciation charge for wooden patterns be 10 percent per annum of the record cost, and for metal patterns similarly 5 percent, with the proviso that the depreciation value cannot go below the scrap value of the material.

(4) That in consideration of the heavy depreciation charge provided for, the age of every pattern shall date from the last time it went into the foundry to make a casting therefrom, this record date proving that it must have been in proper condition for work at that time. Active patterns therefore retain their full value, semi-active patterns will be restored to full value every time they are used after being put in order or replaced, and patterns which have become obsolete in the course of time, are dead when ten years have elapsed.

(5) Customers' patterns, being naturally active, or if not nevertheless impose obligation for full payment upon the foundry having them, in case of fire, are not subject to depreciation and their value must be ascertained by the foundryman and noted on the record card when received.

(6) To carry out this line of action, a form of record is recommended as between the foundry and insurance interests, which is to be kept strictly up to date by the founder, and always open to inspection and controlled by the insurance representatives, and upon which records losses are to be adjusted.

(7) That after due discussion and agreement between the two interests, a pattern clause based upon the standards adopted by the American Foundrymen's Association and approved by the National Board of Fire Underwriters, be used and attached to foundry insurance policies, and the 10 percent clause limiting insurance carried on patterns be abrogated with such foundries as conform to the requirements as to systematic valuation and recording of patterns defined in the standards agreed to.

The committee on Instruction Papers, H. E. Field, chairman, reported that four papers had been written, published and distributed—two on molding and two on foundry metallurgy—and suggested, if the association decided these had proved of sufficient value to warrant their continuance, that a course of papers be started in patternmaking and foundry accounting; also, if the work was to be carried out to its highest efficiency, it would probably be necessary to employ some authorities to write papers, for which an appropriation should be made by the association.

In the report of the secretary of the Metallurgical Section, he stated they had been handicapped in enlarging their membership from the outside by the unwillingness of foundry or furnace chemists to pay the $10 membership fee. He suggested that the section should branch out along the lines followed by the foundry foremen and draw its membership from outside the association, which would permit of a reduction in the dues and a large increase in the membership. On the matter of standard methods for analyzing iron, which had been referred to the section, the report stated that "since the last convention, bound copies of the methods of analysis compiled by the secretary had been sent out to prominent chemists all over the country." A personal letter was sent with each one, asking for assistance in this work, and he now had on file a list of many prominent chemists willing to aid in this work.

Standard Specifications for Coke.

In the memorial on "Standard Specifications for Foundry Coke," which was brought verbally before the society by Dr. Moldenke, he said there was a feeling that if it were possible to standardize the composition of a normal coke, so far as the sulphur, ash and the moisture were concerned, or at least the sulphur, arrangements might be made by which coke could be bought and sold on that standard, any excess over it to be compensated for in rebates and any decrease from the standard in premiums. Dr. Moldenke said that the various coke manufacturers had been approached on the subject and that they seemed favorable, especially the by-product men, as the payment of premiums for lower sulphur cokes would enable them to buy better coals for coking. The presentation of the memorial caused considerable discussion as to the relative merits of Connellsville, by-product and other cokes, and resulted in the adoption by the association of a resolution to request the American Society for Testing Materials to take up the standardization of coke.

TUESDAY EVENING.

At this session George H. Hull, of New York, read a paper on the "Pig Iron Warrant System as Applicable to the Foundry," printed elsewhere in this issue, which attracted considerable interest, the listeners asking many questions of Mr. Hull regarding details of the system not covered in his paper. The paper of E. H. Mumford, of the Tabor Mfg. Co., Philadelphia, entitled, "Molding Machines, Their Uses," briefly described the evolution of this class of machinery as well as the various types of machines made. No discussion followed, and the other two papers on the same subject, prepared by Herbert M. Ramp, of Schenectady, N. Y., and S. H. Stupakoff, Pittsburg, were read by title only because of the lack of time to take them up. The paper prepared by H. F. Frohman, Cincinnati, entitled, "Some Labor-Saving Suggestions for the Foundry," which was printed last week as well as those on "By-Product Foundry Coke," by Clarence M. Schwerin, Chicago, and "The Engineer and the Foundry," by Dr. R. Moldenke, were also read by title.

Relative Merits of Eastern and Western Castings.

Following the reading of the paper on "Moisture in Molding Sand," prepared by W. S. Morehouse, New York City, an amusing and interesting discussion took place as to the relative merits of castings made in Eastern and Western foundries. It grew out of a statement made by David Spence, of the Greenlee Foundry Co., Chicago, formerly of Boston, who said that he had found in his experience that most Eastern foundrymen made better castings than those in the West which he attributed to the care in the selection of sand used. Quite a number took part in the discussion of this point, though their remarks were more in the nature of banter than serious statements. In the course of his remarks, Mr. Spence gave a formula to prevent scabbing. He said in making a facing of one to six, take five parts new sand and one part of Jersey medium fire sand and mix a facing from that with a proper dampness of the sand, and there would be very little scabbing unless the molder was careless in the finishing of his mold by slicking the Ceylon lead.

The next paper taken up was that of W. H. Carrier, of the Buffalo Forge Co., Buffalo, on "Cupola Fan Practice." After the reading of extracts from this paper, which had not been printed, a heated discussion followed, dealing first with the proportion of the different gases in the products of combustion from the cupola. The consideration of this subject naturally led to the discussion of melting ratios, the general consensus of opinion being that for ordinary machinery castings and light work, 1 to 8 was good practice, though with heavy work and long heats and a large cupola, higher ratios could be obtained. In connection with the discussion on the melting ratio, the question of center blast tuyeres came up, in which the fact was brought out that several foundries in different parts of the country were using or had used successfully the center blast in large cupolas. The question of the amount of air was finally tersely stated in the following sentence: "The question of blast is not a question of pressure, but a question of volume of air well distributed. "By the time this discussion was ended, the midnight hour had passed and the meeting adjourned.

WEDNESDAY MORNING.

Change in Pig Iron Specifications.

As a special order of business, the motion of H. E. Field, of Pittsburg, to change the standard specifications for foundry pig iron proposed by the American Society of Testing Materials, which had been presented at the opening session, came

up for discussion. The changes which Mr. Field said were necessary, to prevent the report from being considered absurd by those interested in the purchase of iron by analysis, were in the paragraphs referring to "Sampling" and "Allowances and Penalties." On the former the printed report reads: "At least one pig shall be selected at random from each *two* tons of every carload, and so as to fairly represent it." The other paragraph excepted to reads: "A deficiency of over 10 percent in the silicon, up to 20 percent, and a further increase in sulphur up to .01 over the above allowance, subjects the shipment to a penalty of 1 percent in the price for each element so affected." Mr. Field stated that no foundry chemist would have the time to take a pig from every two tons, especially where large amounts were used, and suggested that the ratio be changed to read, "one pig from every four tons," which is equivalent to 6 pigs to a car, the method used by a majority of the chemists at the present time.

The change suggested in the paragraph referring to penalties was that, instead of 1 percent, the penalty be increased to 4 percent. Mr. Field called attention to the fact that under a penalty of 1 percent the foundryman would get only about one-fourth of the difference in the cost of No. 2 and No. 3 irons, whereas at 4 percent he would receive a rebate of about 50 cents a ton, the usual difference in the price of the two grades.

Fred W. Bauer, Cincinnati, took exception to Mr. Field's statements and said that if the market price of iron should take one of its periodic advances to high water mark, the foundrymen would be getting 80 cents a ton, and possibly $1 a ton under the change in penalty suggested; and he doubted if the furnaces would stand for it. He recommended that the simplest and best way would be to establish a definite relative value on different silicon contents, and insert that in the contract in so many words, and moved to amend Mr. Field's motion accordingly.

H. C. Loudenbeck, of the Westinghouse Air Brake Co., Wilmerding, Pa., was another speaker, and wanted the amendment of Mr. Field to contain the clause that if the iron did not analyze within the limits, as set forth by the specifications, the buyer had the right to reject the iron or pay a lower price for it, according as he desired; otherwise, the foundryman would probably be compelled to take a lot of iron which he had no use for.

Mr. Barbier, a chemist, of Milwaukee, said that no hard and fast line could be set down as to accepting or rejecting pig iron, or giving bonuses or charging penalties on the silicon contents, only as the absence or presence of the three other metalloids governed the quality of the pig iron, as well as silicon.

After further discussion, which was taken part in by Messrs. Slocum, Magee, Field, Flinterman and others, Mr. Field's motion was presented to the association in its amended form, giving the buyer the right to reject the shipment or accepting it at a penalty of 4 percent reduction in price at his option, and it was carried. It was the sense of the association that before the specifications were finally adopted by the American Society of Testing Materials, the matter should again be referred to the A. F. A.

Foundry Foremen's Section.

With the close of this discussion, the meeting was turned over to the Foundry Foremen's Association, and President Thomas and Secretary Murphy occupied the platform. The president's address was brief, after which the meeting took up the paper prepared by David Spence, of Chicago, on "The Need of Modern Foundries." A number participated in the discussion of this subject, the sentiment of all present being voiced by the statement of one of the speakers that modern men, who would not condemn an article before it was tried, were as necessary as modern foundries. Augustus T. Williams, of Philadelphia, said the greatest need of the foundry was the lessening of the demoralizing influence of the drink habit among molders, and told of his experience in his efforts to stamp it out among his own men. Secretary Murphy spoke of an arrangement in use in a shop in which he had worked, where once in the morning and again in the afternoon the men were sold beer and other drinks. There was a fresh water spring also in the foundry for those who preferred water. This method, he said, had the advantage of keeping the men in the shop, and was more to their liking than building lockers, closets, wash basins, etc.

The Apprentice Question.

The paper entitled "The Core Bench," printed in our last issue, was read by its author, Benj. D. Fuller, Allegheny, Pa., and was followed, without any discussion, by one on "Foundry Apprentices," prepared by Charles H. Thomas, Newark. This was probably the most important paper read at the morning's session, from the standpoint of the interest and discussion it provoked. All those who talked deplored the great lack of suitable material for molder's apprentices and were unanimous in the opinion that something ought to be done to remedy the existing conditions. The blame was distributed by the speakers among the foundry owners, foundry foremen, the boys themselves and on the growing use of machinery. As against the suggestions of Mr. Hay that the foundry foremen take the boys more seriously and undertake to spend a little time with them each day, laying out their work, rewarding good results with more difficult jobs and an occasional raise in pay, preventing the repetition of mistakes by the right kind of instruction, Archibald M. Louden said that from his experience too much pampering of this kind would spoil the apprentice, especially those who were drawn from the illiterate foreign element, which he said furnished most of the foundry apprentices nowadays.

Another speaker said that no general rule could be laid down with regard to the instruction of apprentices. Some were apt, others obtuse, and as you found them so would the foreman have to handle them.

Mr. Gilmour, of Peoria, said he attributed the reason for the lack of good apprentices to the ratio insisted upon by the molder's union, which was altogether too small for the growing needs of the foundry industry.

Mr. Williams, of Philadelphia, said the trouble was largely with the foremen themselves who kept the boys on cheap work. He had no apprentices in his shop, and added that his conscience would not permit him to encourage boys to follow a calling that was so rapidly being killed by the use of molding machinery and other labor-saving appliances. As showing the difficulty which foundry foremen had to contend with these days in getting good men, he said he advertised some time ago for seven molders to do a certain class of work, and out of 127 men who answered the ad. not one of them was competent to do the work required.

Secretary Murphy advocated night classes for the winter months. He said this had been tried in a district where he formerly lived, with remarkably good results. The various local foundry foremen acted as instructors, the expenses of maintaining the classes being borne by the foundry owners.

Another speaker said that boys should be taken on six months' trial and if at the end of that period they did not show enough progress or desire to learn the trade they should be let go. He added that there should be inserted in the indenture papers the right of the apprentice to appeal to the foreman for better work after he had fully mastered the details of that on which he had been put, and if he did not get it from the foreman, he should have the right to appeal to the firm. No boy, he said, should have to feel that he depended on the good will and amiability of the foreman to properly learn his trade.

After this discussion closed, David Reid, Columbus, O., followed with his paper on "Specifications—What They Mean to the Foundryman," after the reading of which the meeting adjourned. The other papers scheduled for this session, were read by title only.

WEDNESDAY AFTERNOON.

It had been arranged to devote the afternoon session to a discussion of subjects of interest to patternmakers, while the local reception committee entertained the ladies with a trolley ride around the city. This plan was upset, however, by the appearance of a brass band in the rotunda of the hotel, led by members of the local reception committee, who announced, after a few airs had been played, that trolley cars had been provided to accommodate all the convention visitors and all were invited to take a trolley ride and visit the plants of the Chandler & Taylor Co., American Foundry Co., and the Brown-Ketcham Structural Iron Works. As practically every

one attending the convention accepted this invitation, no session was held in the afternoon. At the plant of the Chandler & Taylor Co., the visitors were especially interested in a working exhibit of the Keller rammer made by the Philadelphia Pneumatic Tool Co., in which it was seen ramming up the sub-base of an engine frame. This company's plant was described some months ago in *The Iron Trade Review* and further comment on its many unique features is unnecessary at this time.

WEDNESDAY EVENING.

Following the business session and election of officers in the fore part of the evening, the results of which are given elsewhere, the convention was entertained at a smoker and concert given by the local reception committee. Dr. Holmes, chief of the Department of Mines and Metallurgy, of the Louisiana Purchase Exposition, made a short speech at the close of the program. He briefly described some of the principal exhibits that he thought would be of interest to all foundrymen, and said he had made the trip from St. Louis purposely to invite the foundrymen to the Exposition and to offer his assistance in making their visit at the Fair both pleasant and valuable. Dr. Holmes told of the plans of the Department of Mines and Metallurgy to make tests of all the coking coals in the country, and asked the co-operation of the association in this work. A committee was afterwards appointed to take up this work in co-operation with Dr. Holmes and his staff. Ex-Mayor Bookwalter, of Indianapolis, also addressed the meeting before it adjourned.

THURSDAY MORNING.

This session was given over almost entirely to the Metallurgical Section. Probably the most important paper discussed was that of H. E. Field, on the "Effect of Manganese on Cast Iron," which showed the beneficial results of the use of manganese in foundry practice. W. G. Scott's paper on "Scrap Iron" was read by title. R. S. MacPherran read a paper on "Sulphur in Cast Iron." The paper prepared by H. C. Loudenbeck on "The Value of a Chemist and Metallurgist in a Manufacturing Plant" brought out the importance of the chemist to a manufacturing plant, not only in connection with the foundry, but also analyzing the various other materials used. Arch. M. Louden's paper, "Memoranda on the Metallurgy of Cast Iron," was read by title. The paper by H. L. Williams, Chicago, on "Pig Iron and Its Constituent Elements" was read by H. E. Field in the absence of the author. The discussion showed the interest which is being taken by foundrymen and those engaged in the selling of pig iron in subjects of the nature covered in Mr. Williams' paper. R. F. Flinterman, of the International Harvester Co., Chicago, read a paper on "Loss in Malleable Practice." The loss was determined, he said, by carefully weighing the heat as it was made up and by weighing back the products of the melt, the losses averaging about 4½ percent. This loss was then checked up by the laboratory to account in different ways for this loss and shown how it was divided. It was found that the loss due to chemical change amounted to about 1 percent; the loss due to iron contained in the slag—that is, iron chemically changed and metallic iron too fine to be separated by water mill—amounted to about 2 percent. There was a further loss of about 2 percent due to the sand adhering to pig iron, thus accounting for a loss of about 5 percent, which was slightly in excess of the loss shown by foundry weights. No discussion followed, but foundrymen interested in malleable practice were asked to submit their experience and opinions in writing.

The paper of H. E. Diller, Chicago, on "Hard Iron," brought out a very interesting discussion in regard to the effects of the different elements on the hardness of iron. The influence of phosphorus in the hardening of iron was especially discussed, and the sentiment of the meeting seemed to be that more information was necessary in order to determine the exact hardening effect of phosphorus on iron.

J. G. Wilson's paper on "The Value of Chemistry in Foundry Practice from a Foreman's Standpoint," was read by the writer and thoroughly discussed. It was an especially interesting paper as showing the growing use of chemistry in making up mixtures for reducing the cost of the product.

In the discussion of standard methods of analysis, it was decided that the most important element to be standardized was sulphur, and that with this accomplished it would be an easy matter to establish standards for the other elements in iron.

Owing to the limited time left for the association to take up the papers that had not yet been read, the Metallurgical Section adjourned at 11:30 a. m., after inviting further discussion by mail on the papers which had been presented by its members. Four members were added to the committee on standard methods for analyzing iron, making the total number 12. The new members are: H. E. Diller, R. S. MacPherran, R. F. Flinterman and H. C. Loudenbeck.

C. J. Wolff, the new president, now took the chair, and the paper prepared by W. H. Parry, Brooklyn, on "Pattern-making in its Relation to Foundry Costs," was read by the author, as was also the paper prepared by John Magee, Chelsea, Mass., on "A Successful Piece Price System." No discussion followed.

The Foundry Industry at St. Louis.

The following resolution was then put before the society and adopted:

"That the American Foundrymen's Association commends the action of the World's Fair authorities at St. Louis in arranging for a special foundry building and foundry exhibits; and also for carrying on in connection with these exhibits a series of coking and other tests of value to the foundry industry.

"That the association urges the foundrymen of the country to aid this important undertaking in every way practical.

"That the association appoints a committee of three to co-operate with the World's Fair Department of Mines and Metallurgy in planning the tests to be made in the exposition foundry and government coke plant."

The president appointed Dr. R. Moldenke, chairman of this committee, and H. E. Field, of Pittsburg, these two gentlemen to select a third member who will probably be some one interested in the coke industry.

Before adjourning a vote of thanks was tendered by the association to the Commercial Club, of Indianapolis, the local foundrymen, the writers of papers and all who had assisted in entertaining the visiting members and their friends.

No decision was reached regarding the next convention city. Invitations were received to hold the convention in Cleveland in 1905 and in Philadelphia in 1906. There was a sentiment expressed that it might be well to hold the next convention in a Southern city and Birmingham was suggested, and there were still others who wanted the next convention held at a summer resort, Atlantic City being mentioned. The matter, however, was left with the executive committee, and the convention then adjourned.

The following were registered in addition to the names reported last week:

W. H. Carrier, Buffalo Forge Co., Buffalo.
John Reynolds, Indianapolis.
Wm. Davis, Indianapolis.
Benj. D. Fuller, Pittsburg.
L. H. Chesley, Danville, Ill.
J. W. Dopp, Tabor Mfg. Co., Chicago.
Jos. F. Rothe, Green Bay, Wis.
Jos. J. Wilson, Leland & Faulconer Mfg. Co., Detroit, Mich.
B. J. Taylor, Toledo, O.
Charles L. Bieler, Indianapolis, Ind.
M. J. Colligan, Hamilton, O.
W. W. Ricker, Hamilton, O.
W. W. Sly, Sly Mfg. Co., Cleveland.
H. E. Diller, Western Electric Co., Chicago.
G. Hokanson, Three Rivers, Mich.
F. S. Pevey, Pevey Bros., Lowell, Mass.
G. A. Williams, Aermotor Co., Chicago.
Mathew C. Perry, Anderson, Ind.
J. C. Merrill, Lock Haven, Pa.
J. W. Gleason, Gleasonton, Pa.
C. M. Gibson, Williamsport, Pa.
J. M. Pickands, Pickands, Mather & Co., Cleveland.
Chester A. Peebles, Matthew Addy & Co., Cincinnati.
R. S. McPherran, Allis-Chalmers Co., Chicago.
Irvin McDowell, Field-Evans Iron Co., Chicago.
W. S. Pattin and T. O. Pattin, Pattin Bros. Co., Marietta, O.
W. E. White and L. Luddy, Muncie Foundry & Machine Co., Muncie, Ind.
E. E. R. Tratman, *Engineering News*, Chicago.
Lyman Arms, Columbus Iron & Steel Co., Columbus, O.
R. F. Flinterman, International Harvester Co., Chicago.
B. J. Taylor, Toledo.

Edwin Leedhouse, Falls Rivet & Machine Co., Cuyahoga Falls, O.
Dr. Holmes, chief of Department of Mines and Metallurgy Louisiana Purchase Exposition, St. Louis.

CONVENTION NOTES.

The Falls Rivet & Machine Co., Cuyahoga Falls, O., had an exhibit of the improved Wadsworth core-making machine, which was in charge of George H. Wadsworth, the inventor.

In the exhibit of the Philadelphia Pneumatic Tool Co., Philadelphia, which was in charge of A. G. Hollingshead and Thomas Bullock, a full line of its pneumatic rammers and chippers was shown. The company distributed souvenirs in the shape of a 20-year calendar, tape measure and aluminum key chains.

The Hanna Engineering Works, Chicago, had an exhibit of one of its large tripod pneumatic sand shakers, which was shown by E. E. Hanna.

The J. D. Smith Foundry Supply Co., Cleveland, distributed stick pins of miniature cupolas with the initials of the American Foundrymen's Association cast on the face.

Henry E. Pridmore, Chicago, the molding machine man, gave away a very useful souvenir in the shape of steel tape measures, 3 feet and 6 feet long, as a reminder of the fact that he made molding machines exclusively at his plant at 19th and Rockwell streets.

Card cases and pocketbooks were given away by the representatives of the Garden City Sand Co., Chicago, Messrs. McNeal and Chambers.

Hickman, Williams & Co., Chicago, distributed letter openers.

The Dodge Mfg. Co., Mishawaka, Ind., had a lot of photographs of its plant on exhibition, and gave away towels as souvenirs.

J. S. McCormick Co., Pittsburg, distributed pamphlets containing the program of the convention, illustrated with halftone reproductions of the group pictures taken at each convention since 1896.

Eastern Pennsylvania.

HARRISBURG, June 14.—Conditions in the iron and steel works of this part of the State are not better than they were a fortnight ago; in fact, at certain points they are worse. At Pottsville the plant of the Eastern Steel Co., which has been built within the last two years at a cost of several millions, has been closed indefinitely. No reason has been assigned for the close, but it is said that it is due to dullness in trade. It is planned to increase the stock of the company to $9,000,000, and a meeting will be held shortly.

Both the blast furnaces at Bellefonte, Pa., have suspended operations because of slack demand.

The Pennsylvania Steel Co.'s rail and Bessemer mills have been started for a short run, after being closed for two weeks. It is said that they have some work for the summer. The rest of the company's plant at Steelton is running as usual, but is doing little at Lebanon.

The Central Iron & Steel Co. started its first basic open-hearth furnace in South Harrisburg very successfully on June 9. It is one of four, each of 50 tons capacity. The other furnaces will be started about a month apart. Later on the company will install a direct metal route between its steel plant and its Paxton furnaces.

The Letort Axle Works at Carlisle will build an addition for its boiler room.

The National Brass & Iron Works and the Consolidated Hardware Co. at Reading have consolidated, John E. Harbster being president. The consolidation includes four large works.

Among the new corporations granted charters at the State capital lately were: York Engineering Co., general building, power plants, etc., York, capital $2,500; Schell Hardware Co., Connellsville, capital $60,000; Beaver Valley Reduction Co., Rochester, capital $10,000.

The Eastern Steel Co., Pottsville, Pa., of which Veryl Preston is president, will issue $2,000,000 of convertible debenture bonds, to cover cost of additions being made to the plant and to provide working capital. The new beam mill and other additions are being erected under the direction of the Garrett-Cromwell Engineering Co., Cleveland.

LAKE SUPERIOR IRON MINES.

The big steel ship Augustus B. Wolvin is "marked up" at the Two Harbors docks of the Duluth & Iron Range road to leave about Friday with her first eastbound cargo, and is booked for 10,000 gross tons. This is more than 2,000 tons greater than has ever been carried out of this lake, and exceeds Wm. Edenborn's banner Lake Michgan cargo by 1,793 gross tons. That load, however, was taken on a draft of 20 feet, while Wolvin cannot load much better than 18 feet, particularly as this is her first cargo down. Wolvin's cargo of 10,300 tons of coal upbound exceeded the largest before carried by 2,600 net tons.

Ships of all fleets are gradually getting into line, and a number of ore cargoes have been cleared the past few days. The ore roads have not yet put summer schedules into force, and may not for a short time. Their docks are full and the regular service brings enough ore to care for that part of the lake fleet so far coming under spouts. The situation in business circles on the Lake Superior ranges is clearing and the extreme dullness that has prevailed of late, worse than than that of the darkest times of the panic years of 1893-94, is giving way to activity. But an immense amount of money has been lost by the deadlock.

It looks now as though no mining might be done in the Nashwauk district of the Mesabi range this year. Nothing is going on there now, and the Great Northern road, which built a very expensive line to three mines there a year ago, will probably make no earnings from it before 1905. Some mines in this section have proved somewhat unsatisfactory, but will of course come in later. Restriction of operations about Nashwauk makes Forest mine, of the Tesora Mining Co., the most westerly active property on the Mesabi. The Wallace Contracting Co. is now engaged in stripping surface there. This is a small job, but, judging from the appearance of things, rather an ungainly one. Forest produces a nice grade of ore, of which it is understood some has been sold for this year. It has a very slight surface covering ore, but an attempt was made last fall to open it underground. Forest and Stevenson are the only two active mines west of Hibbing.

The various Great Northern companies, with headquarters at Marquette, Mich., and properties on the Mesabi range, in T 57 R 21, have been put on the tax rolls in Marquette county for above $1,000,000. There are eight of these companies.

Duluth & Iron Range tracks are being laid to Bessemer shaft of the Republic Iron & Steel Co., at Virginia, Mesabi range. Bessemer went into the winter with a small stock on surface, and was one of the company's three Mesabi mines that operated during the winter, the others being Franklin and Pettit. Its Kinney mine will ship shortly. Its Wills will probably do nothing this season, and possibly its Victoria will also be idle.

Carnegie Institute Addition.

(Special Telegram.)

PITTSBURG, June 15.—The contract for the erection of an addition to Carnegie Institute will be awarded July 5. The cost will be $5,000,000 and 2,000 tons of steel will be required.

The one stack of the American Steel & Wire Co., in blast at the Central plant, Cleveland, was blown out June 11 in harmony with the policy of the U. S. Steel Corporation to restrict its production. The company now has only stack No. 3, Newburg plant, in operation in Cleveland. Three furnaces are being rebuilt and the stack blown out last Saturday will await improvement of the market.

A cablegram from Santiago de Chile announces that the government decree accepting the bids for constructing the Trans-Andine railway has been signed. The contract has been divided by the Chilean government between William R. Grace & Co., of New York, and Clark & Co. and S. Pearson & Son, of London. The aggregate of the contract is $6,750,000, but ultimatly the government designs to expend two or three times that much on the railway.

A consolidation of the Youngstown Steel Casting Co. and the Youngstown Foundry & Machine Co., both of Youngstown, O., will be effected this week.

THE IRON TRADE REVIEW

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THE REACTION IN IRON AND STEEL.

It is now something over a year since conditions in the iron trade began to be diagnosed as presenting some contrasts to those of the four years of flood-tide prosperity that preceded. With the halfway point in the year only two weeks ahead, there are now sufficient data at hand for an approximate judgment as to the characteristics that will be fastened to 1904 when its history comes to be written in respect to iron and steel. Unsatisfactory the year certainly has been thus far to all connected with the iron trade, and no one expects to find reason for great satisfaction with the six months or more that remain. Yet the tonnage that has gone out of furnaces and mills since Jan. 1 is not greatly below the average of the past five years. Statistics permit of a reasonably close approximation to the production and consumption of steel products; and apart from the substitution of domestic material for what in 1902 and most of 1903 was imported from Germany and Great Britain, the trade has not undergone any serious transformation, albeit consumption is somewhat less than in 1903. The well-known falling off in demand for rails and bridge, architectural, vessel, steel car and boiler material is to be set side by side with generally abundant demand for wire products, wrought pipe and tin plate and a by no means inconsiderable consumption of bars and sheets. And as to prices, the severe decline in pig iron is to be set over against a practical maintenance—apart from some minor evasions—of prices of rails, plates and structural material, and only slight reductions from last year's prices for sheets, tin plate, pipes and tubes and wire and wire nails. Bars, indeed, have seen the greatest reduction made in finished lines, and that has been but a moderate and orderly settling, with nothing of the precipitate crumbling of bar prices seen in the late summer of 1900. In billets, moreover, while agreed prices have not been maintained, there is a long distance between conditions under which raw steel sells for a cent a pound, and those that have given us plates and beams at about that figure and bars at less than 9-10c.

The fact is that while 1904 thus far has been commonly judged a desperately bad year in iron because of its doleful showing in respect to Steel Corporation dividends, there have been altogether too many men at work at blast furnaces, steel works and rolling mills to make out a case of depression or anything closely resembling it. The one or two steel companies in the country that are not either flagrantly over-capitalized or suffering from the unwise expansion programs carried on in the very thick of the boom, have no doubt made fair profits in every month of the year thus far.

As to the future, two views are held. One is that while other causes are responsible for the falling off in the iron trade in the past year, crop and election uncertainties are largely chargeable with the present continued abstention of buyers, coupled with the feeling that prices are likely in any event to go lower because of the large smelting, melting and rolling capacity built up in the years of flood-tide. Those who think that a few months will bring the desired change for the better, in case the outcome of the uncertain factors is favorable, consider that the powers in the steel trade have done well to hold prices in the interval and that the next active movement will start at substantially the present level.

Over against this view is one that looks for a much more radical readjustment in iron and steel than anything the past year has brought, before another period of prosperity for the trade can set in. Whatever basis there is for the argument often repeated in the past half year, that no more business would be secured by reducing the prices of the various pools and associations, it cannot be urged indefinitely. It is itself a virtual admission that while conditions do not now exist rendering reduction expedient, they will soon exist. High cost of labor, high cost of living, high cost of all materials of construction have marked the recent years of large profits in the iron trade. The excesses of capital that put no limit to the profits of industrial corporations, and that thus were bound to bring their own penalty by putting products to the point where the buyer would begin to do without them, have been paralleled by the folly of labor, which has made the cost of production extravagantly high. The complaint here is not that high wages have been paid, but that along with the high wage has come a feeling that it matters little what return is given for it. Inefficient and inferior labor has thus received more for the work done than highly efficient labor has received under normal conditions and with average prices. The result has been uneconomical production—such a high cost of manufacture as compelled high prices in the market. The disease that has led capital to glut itself with the artificial and demoralizing profits of promotion and underwriting has traveled all along the line, and we have had throughout business and industry an unnatural desire to get profits and wages easily. This must be done away with before any considerable forward movement comes again, and it cannot be eliminated except on a lower level of prices for labor and products.

Wage reductions, like reductions in commodity prices, have been comparatively small thus far. The

readjustment, as far as it has gone, has consisted more in weeding out the less skilled workmen in factory forces, with the resultant moral effect on the men remaining at work, than in any considerable horizontal cuts. There has been some advance made, also toward the regaining by employers of such control of their business as is essential to economical production. There must be more of this before manufacturing can go ahead again on a sound basis.

So far as prices of iron and steel products are concerned, the present basis is far from indicating a reactionary period. Pig iron soared highest in 1902 and has suffered the most severe decline. It may be considered not far from low point today, unless all industry is to plunge into depression of which there are no indications now. Steel products in general are still well above the low points that have come in the wake of boom periods heretofore. The brief reaction in 1900 was violent in proportion to the rapidity of the ascent in 1899. Bars fell $27 a net ton, or from $45 in January, 1900, to $18 on large contracts in August; structural steel from $45 to $30, and plates from $48, Pittsburg, to $21, while some shipyards bought at 1c a pound. Compared with these low points present prices are high. While history may not repeat itself, experience has shown that after a period of high prices buying is not stimulated into a new strong movement except it is tempted by low prices. In the present case it need not be expected that a spread of $10 will be maintained indefinitely between Bessemer pig iron and Bessemer steel, and if billets fall—as they have already done to some extent, in spite of pool regulations—the whole structure of rolled products prices must be remodeled.

Unsatisfactory as it is thus far, 1904 has not been without its surprises in the iron trade, both as to consumption and the maintenance of prices. While there is much that argues that the readjustment process has yet some distance to go, the developments of the past six months suggest that prophecy based merely on records and cycles is liable to need revision.

WINTER AND SPRING WHEAT CROPS.

The report of the Department of Agriculture for the first of June upon the wheat outlook has been received in business circles with some little satisfaction. The crop prospects are shown to be favorable rather than otherwise, although they suggest a continuance of the conservatism that has been such a marked characteristic of business for many months. In comparison with previous years the outlook is for barely a fair crop of winter wheat. It should be remembered that domestic requirements naturally increase from year to year, so that with a population of 82,000,000 we are apt to have less surplus for foreign markets. Notwithstanding the fact that corn stands first in value among the cereals for domestic consumption and cotton is the most important crop for the export trade, interest in wheat has not been lost since the time it was first in importance in both domestic and foreign markets as a basis of business prosperity. The hay crop, it will be remembered, also exceeds wheat in the actual value of the amount produced, and with corn and oats is the main food of live stock and therefore the foundation for provisions. Hence, attention is less absorbed by wheat, but the latter is more associated in the mind of the public with the general welfare of the country than are other crops.

While the prospect is not favorable for a large crop of winter wheat, we seem likely to be favored with a fair yield. The area sown to winter wheat this season is in round numbers only 27,000,000 acres, as compared with 32,500,000 acres last year, and the average condition is only 77.7 against 82.2 a year ago at the corresponding time. These facts indicate a yield of about 366,000,000 bushels as compared with about 400,000,000 bushels last year, which was less than in either of the two preceding years. In 1902 a little less than 412,000,000 bushels was raised and in 1901 the crop harvested was 429,675,000 bushels.

There is reason to hope that the deficiency in the winter wheat crop may be partly made good by the increased yield of the spring grain; but this latter crop is more subject to the vicissitudes of weather, and since the department's estimates were made conditions have been unfavorable rather than otherwise. It is estimated that the acreage sown to spring wheat this year is about 17,150,000 acres, which is slightly above that of the preceding year, but it is below the area sown in either of the two immediately preceding years, and also smaller than that of 1898 and 1899. In 1901, when the largest crop ever produced was harvested, over 21,000,000 acres were under spring wheat and the yield was in the neighborhood of 319,000,000 bushels.

The condition of spring wheat on June 1 was 93.4, which would indicate a yield of 292,000,000 bushels. It is probable, however, that the high condition of the spring crop will not be maintained to the time of harvest, being subject to unfavorable changes through natural causes. Present indications point to a yield of wheat, both winter and spring, in round numbers, of 658,000,000 bushels, which is more than the yield of last year, but less than was raised in 1902 and 1901. In the latter year, it will be remembered, was harvested the "bumper" crop, but even as early as 1898 we had harvested wheat crops of 675,000,000 bushels and over; considerably more than there is any prospect of during the present season. It is interesting to note that in 1901 about 748,500,000 bushels was harvested on an area of 49,895,000 acres.

The high prices prevailing this year have brought about a serious falling off in the export trade and there is little likelihood of an increased export business from the present growing crops; even a decline in the foreign movement would not be surprising. More than any other crop the price of wheat in the world's markets is subject to the harvests abroad, our exports depending not only upon our own surplus, as in the case of cotton, but upon the amount available from other export countries. American wheat occupies a less commanding position in the world's markets today than ten years ago and seems likely to lose more ground unless there is a stimulus to increase the acreage soon.

In connection with wheat considerable interest is taken in the predictions of a very heavy increase in the area planted to corn this year, but it is yet too early to give reliable estimates.

The Labor Situation.

CHICAGO MACHINE SHOP STRIKE.

The Chicago Metal Trades Association has been successful in starting up every one of the 30 shops on which strikes were called three weeks ago by the local council of the machinists' union. None are working to full capacity, but all are running and the backbone of the strike is broken. The first strike to be called in a shop outside of the association occurred last week in the plant of the Featherstone Foundry & Machine Co., 348 N. Halsted street, when 45 of the company's machinists walked out.

The Chicago Metal Trades Association has adopted a new set of rules, under which hereafter all the shops of its members will be operated. The notice is as follows:

NOTICE.

1. Until further notice this machine shop will run on the basis of 54 hours per week, with a half holiday, Saturday. The working hours will be from ——— a. m. to 12 noon, ——— p. m. to ——— p. m. Saturdays from ——— a. m. to ———. Night gangs shall work not to exceed 54 hours per week on the regular night schedule posted in the shop, and any overtime worked outside of the schedule hours will be paid for as overtime.

2. All overtime up to 12 o'clock midnight will be paid for at the rate of time and one-half, and after 12 o'clock, and the following holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Sundays, shall be paid for at the rate of not less than double time. In cases of emergencies, where shop machinery breaks down, or needs repairs, and it is absolutely necessary to repair the same so that the factory can run on the following day, or on Monday, this work will be paid for at the rate of time and one-half. (The repairs above referred to apply only to the machinery of the company.)

3. There shall be no restriction of the opportunities for deserving boys to learn a trade in this shop. No apprentice shall, except for just cause, leave the service of this company until he has served his full term of four years, when he shall receive an apprentice certificate and if competent receive journeyman's wages. This shall not affect existing contracts with apprentices.

4. There shall be no arbitrary limitation of the amount of work a workman or machine may turn out in a day. We will not countenance any conditions which are not fair and which do not insure a good wage to a good workman.

5. This company being responsible for the work turned out by its workmen shall, therefore, have full discretion to designate the men it considers competent to perform the work, and to determine the conditions under which it shall be prosecuted. Where the nature of the work permits, two or more machines will be operated by one person. While disclaiming any intent to reduce the wages of our competent machinists, roughing and duplicate work will be done by handy men, or other employes at the discretion of the company.

6. No reduction will be made in the wages paid any individual workman at the present time without due notice to such workman.

7. Foremen shall be the agents for the company and not members of any labor organization.

The local association has arranged for another meeting of the foremen of the shops of its various members, to be held at the Sherman House, Thursday evening, June 16. A dinner will precede the meeting, after which speeches on the following subjects will be made: "The Engaging of Help," S. T. Nelson, superintendent of the Sullivan Machinery Co.; "Confidence and its Effect on Shop Management," S. A. Hawkins, of the W. A. Jones Foundry & Machine Co.; "Foremen's Opportunity," F. F. DuBrul, commissioner of the National Metal Trades Association. It is the intention of the association to hold these foremen's meetings once a month, so as to secure the sympathy and active co-operation in their work of the men who have actual charge of the shops.

BOILERMAKERS BREAK CONTRACT.

In direct violation of the terms of their contract, nearly 300 members of the Boiler Makers' Union employed in the shops of the Illinois Central railroad system, went on a strike June 8 under orders from Chicago headquarters of the union. The cause of the walk-out was the refusal of the company to grant an increase in wages ranging from 18 to 25 percent. Under the terms of the contract 30 days' notice of a change is required of both parties to the contract. The boilermakers did not give the Illinois Central managers any such notice. During the short negotiations with the boilermakers after the demand was made, the men were shown that they were receiving the highest wages paid in Illinois Central territory, and higher than the majority of railroads were paying. It was also pointed out to them that the net receipts of the company for the ten months ending April, 1904, were $1,227,000 less than for the corresponding period last year.

NO AGREEMENT ON BAR IRON SCALE.

(Special Telegram.)

PITTSBURG, June 15.—The bar iron conference between the Amalgamated Association and the Republic Iron & Steel Co., after an eight-day session adjourned at Cambridge Springs yesterday, without having adopted a scale. The committee representing the association refuses to agree to a $4.50 puddling rate on a one-cent card and the manufacturers will concede nothing more. Before adjournment it was decided that another conference could be called before July 1 at the request of either party. On Friday the bar iron wage committee meets the officials of the Carnegie Steel Co. to discuss the scale for the iron mills of this company taken over at the time of the absorption of the American Steel Hoop Co. The demands of the Carnegie Steel Co. will be the same as those of the Republic Iron & Steel Co. It is extremely doubtful if a scale will be arranged before July 1, and while a board of conciliation or arbitration has been suggested in the event of no scale settlement before that date, the men to continue working until this board decides, the plan requires the sanction of the Carnegie Steel Co. before such a board can be agreed upon. With the adjournment of the bar iron conference it is probable that the sheet and tin plate scales will be discussed with manufacturers next week. The latter conferences promise to be protracted and there is little probability of any settlement before the end of the present scale year.

END OF THE STRIKE ON THE LAKES.

The strike of the masters and pilots on the great lakes has collapsed. Every day during the past week a number of vessels have started. Little difficulty was experienced in getting captains to command the boats, but mates were not so easily obtained. However, it was evident that the effort to continue the strike could not succeed. Last week H. C. Barter, secretary-treasurer of the International Longshoremen, Marine and Transport Workers' Association, declared in positive language that under no conditions would that organization assist the masters and pilots in their fight against the Lake Carriers' Association. "Our organization is not going to strike in sympathy with any other organization, and I rise at this time to protest against using this organization as a club," he said. "President Gompers has no authority to call a general sympathetic strike and should he ask us to go out, this organization would refuse. Our word is as good as our bond. We have never yet violated an agreement entered into, but have carried all out faithfully. I challenge President Gompers or any one else to order us out on a sympathetic strike. The American Federation of Labor has no power to order us out. I would advise withdrawal from the federation in preference to submitting to such an order if it were issued."

William Penje, secretary of the Seamen's union, called at the office of the Lake Carriers' Association and in behalf of the Lake Seamen's Union and the Marine Cooks and Stewards' Union declared that they would not violate their agreements by going out on a sympathetic strike, either on behalf of the Masters' and Pilots' Association, the International Pilots' Association or any other organization, whether affiliated with the American Federation of Labor or not.

President Keefe, of the Longshoremen's Union, made a similar statement. These declarations gave the strikers little ground for hoping for a sympathetic strike, but Capt. J. M. McGregor, of the International Pilots' Association, spent several days in Washington and New York endeavoring to induce President Gompers, of the American Federation of Labor, to order sympathetic strikes. These efforts were futile and on Tuesday evening, June 14, Capt. Paul Howell, district captain of the American Association of Masters and Pilots, declared the fight against the Lake Carriers' Association off so far as the masters and pilots were concerned. He reached this decision after he had consulted the captains of all the leading harbors and learned that nearly all were

going to work. He wired all the harbors to instruct all the captains of the union to go to their boats. He made the following statement:

"We concluded it would be a good policy at this stage of the game, owing to existing conditions over which we have no control, to advise our captains to go to work and make the most of a bad situation. Our mates will meet at the earliest possible opportunity and make arrangements along the line of their own ideas and present them to the Lake Carriers' Association for acceptance. In the meantime the mates will remain where they are until this arrangement is made and agreed upon by the two associations."

All Tuesday night and Wednesday managers of fleets were in receipt of applications from captains and mates for their old jobs. Telegrams came from all ports on the lakes and many men who had been out on the strike made personal applications. All the indications were that the mates would not attempt to form a union at present and that they could not succeed if they should make the attempt. One of the largest companies will refuse to employ any mates who belong to a union and this policy is likely to become general.

VICTORY FOR THE SANTA FE.

John Slocum, general president of the International Brotherhood of Blacksmiths and Helpers, of Chicago, recently visited Albuquerque, N. M., and other towns in which machinists of the Santa Fe railroad are on a strike. Concerning this strike Mr. Slocum says: "I am of the opinion that the Santa Fe company had the machinists licked in the fight before it was ever started. Of course, the company will be disturbed for a time, getting an entirely new force of men in their shops all at once, but in time matters will right themselves. There are too many idle men in the country at the present time, and all the big cities of the country are overcrowded with mechanics of every sort. In Chicago there were some eight or nine hundred men answered the advertisement of the Santa Fe employment agent for machinists and boilermakers, and out of that number there must be some good men. I personally feel sorry for the boys, but they should know better than to try and lick the Santa Fe company alone."

NATIONAL METAL TRADES ASSOCIATION.

CINCINNATI, June 14.—The defense of the Chicago machinists' strike is on in full force. The National association opened up an office in Chicago, with Secretary Wuest in charge, and every day consignments of men are received from various points. Various Chicago manufacturers supplied each a man from their establishments to go to the different cities where advertisements were placed. Accompanying each of these employes is one of the "certificate men" in the employ of the National association, whose duty it is to see the men through. They are having but little difficulty in securing competent machinists to go to work under the conditions offered. Full protection is furnished by the city and private police. No men are being boarded in the shops, but boarding houses have been secured in the immediate vicinity of each shop. Should there be any violence, injunctions will be taken out immediately and rewards offered for the conviction of the violators of the law. The individual members of the National association have been called on to furnish as many men as they can secure and they are responding generously. In addition the local secretaries operating labor bureaus have been enlisted, and through their efforts, reinforcing the other efforts being made, Commissioner DuBrul is confident that the shops in Chicago will soon be fully supplied with first-class men.

The association's certificate of recommendation, which is given to workmen who have seen strike service, and carries with it preference in employment in all the shops of the National association, is one of the best inducements that can be given to workmen to take strike jobs. Hundreds of these certificates have heretofore been issued, and the holders, having all had steady employment tell their friends about it, with the result that many workmen in different parts of the country are applying for strike jobs in Chicago in order to earn the certificate. The following letter is typical:

"National Metal Trades Association, Cincinnati, O.

"Gentlemen: Seeing by the newspapers here that you are up against it in Chicago, I am ready to come East and do all in my power to help you out. I worked there nine months during the Allis-Chalmers strike, running a boring mill. C. A. Luster, of the Clyde Iron Works, of Duluth, recommended me for your certificate and the courtesies shown me by the members of the N. M. T. A. in Minneapolis this spring were enough for me to give you all the help I possibly can. I can get you several other first-class machinists here who wish to go back East—men whom you can depend on under all circumstances. If transportation is too high to take them from here, I will pay one-half my own fare, if you will stand good for the other half, and will report for work in Chicago.

"Yours truly,

"G. W. J., Certificate No. 1233."

On Monday, June 13, official notification was received at the office of Commissioner DuBrul of the appointment of his successor. The new commissioner is W. P. Eagan, general manager of the Fred W. Wolf Co., of Chicago. Mr. Eagan is eminently qualified for the position, having been a member of the administrative council of the N. M. T. A. for three years. He was originally trained in the law, and became connected with the F. W. Wolf Co. in a legal capacity, later being promoted to the position of general manager. He was one of the prime movers in the organization of the Chicago Metal Trades Association, after the dissolution of the old Machinery Manufacturers' Association in that city. The appointment of the new commissioner is effective July 1. The offices will remain in Cincinnati, with Mr. Robert Wuest in charge as secretary.

The patternmakers' strike in St. Louis, which affected three shops having membership in the St. Louis Metal Trades Association, has been declared off by the union. Such men as the employers require and being taken back individually under the new shop rules adopted May 20. The patternmakers employed during the strike will retain their positions. The boilermakers' strike in that city is still on, being in its fifth week, but the shops are gradually filling up with non-union men. The employers are standing together as one man in their determination to maintain the open-shop principle. In the boilermakers' strike at New York the employers are gradually adding to their forces of non-union men.

LABOR NOTES.

The strike at the boiler shop at the Southern railroad shops at Princeton, Ind., has been settled, after being carried on for six months. The workmen received an advance of 1½ cents per hours.

The union machinists of Dayton, O., have voted almost unanimously against the proposition to strike July 1, also against the piece work and two machine systems.

The strike against the David Luptons Sons' Co., Philadelphia, by the Sheet Metal Workers' Union, has been declared off, and the entire plant, which had been idle for nearly a fortnight, has resumed operations. The strike was due to a misunderstanding concerning apprentices.

The Architectural Wire & Iron Workers' Union at Milwaukee has closed a contract with the Globe Wire & Iron Works of that city for a nine-hour day and ten hours' pay.

The strike of the Sheet Metal Workers of Baltimore, which was started May 2, has been settled. The strike was ordered to enforce a demand of a minimum wage of $3 for an eight-hour workday, the recognition of the card system and a number of shop details. The employers agreed to a shorter day and a minimum wage of $2.75, in addition to a number of shop rule amendments that were asked for by the men. About 300 men were concerned in the strike.

The boilermakers employed at the Utica Steam Engine & Boiler Works, Utica, N. Y., have made a demand for a nine-hour day, with a continuance of pay for a ten-hour day. About 20 men have gone on strike.

Molders employed by the Union Iron Works, of Bangor, Me., have gone on a strike for a nine-hour day and a minimum wage rate of $2.50. The men have been working 10 hours, at wages ranging from $2.25 to $2.75 per day.

The strike at the plant of the Dominion Iron & Steel Co., Sydney, C. B., is still in progress. Controller Cameron, of the company, was assaulted by one of the strikers a few days ago, but was not seriously injured. At a meeting of the subcouncil of the Provincial Workingmen's Association it was voted to raise $100,000 for the purpose of carrying on the strike.

The agreement by which the machinists of the Wm. Tod Co., Youngstown, O., returned to work at a 4 percent reduction in wages, is to expire Aug. 17, 1905, the date on which all the annual agreements of the company expire.

A reduction of 20 percent in the wages of all employes of the Haskell & Baker Co., of Michigan City, Ind., is announced. The company is an extensive manufacturer of box and flat cars.

About 50 men—machinists and molders—employed by the Scranton Steam Pump Co., Scranton, Pa., have been laid off, owing to the slack demand for pumps.

The molders employed in the plant of the American Steel Foundries, Sharon, Pa., went on a strike last week for the purpose of enforcing the restoration of a 10 percent cut made the first of the year. After being out for several days, the company conceded the demand and the plant resumed operations this week.

At the present time the Amalgamated Association of Iron, Steel and Tin Workers is carrying on strikes at the following plants: Canonsburg Steel & Iron Works, Canonsburg, Pa.; Parkersburg Iron & Steel Co., Parkersburg, W. Va.; Shaner Bros., Milton, Pa.; Hoopes-Townsend Works, Fort Washington, Pa.; Lochiel Iron Works, Harrisburg, Pa.; and the Bessemer mill of the Tennessee Coal, Iron & Railroad Co., Bessemer, Ala.

The special grand jury called to investigate the rioting at the Hanging Rock, O., furnace, has found six indictments, three of which were against Hanging Rock strikers, whose names are withheld, as they are not in custody. The grand jury condemned the actions of the mayor and marshal of the village because they had utterly failed to do anything towards preventing the trouble. The actions of the sheriff and the troops were commended.

The employes in the bell weld mills of the Riverside plant of the National Tube Co., at Wheeling, W. Va., have gone on a strike for an advance of 26 cents a day. Two hundred are out.

Personal.

At the election of officers of the Western Tube Co. at Kewanee, Ill., June 7, vacancies caused by the resignation of John F. Pierce, president, and Charles I. Pierce, secretary, were filled. A. M. Hewlett, vice president, was elected president, Charles E. McCullough secretary and John H. Duncan general sales manager.

C. S. Freeman, president of the Freeman Mfg. Co., Racine, Wis., has been elected delegate-at-large from Wisconsin to the Democratic National convention at St. Louis.

C. E. Michael has been elected president of the Virginia Bridge & Iron Co., Roanoke, Va., to succeed W. E. Robertson, resigned. Mr. Michael has been general manager for several years.

Louis Katona, metallurgical engineer of the steel plant of the Privileged Austria-Hungary State Railroad Co., Resicza, Hungary, spent several days last week inspecting the steel plants in the Pittsburg district.

Wallace C. Johnson, a well known hydraulic and electrical engineer of Niagara Falls, is mentioned for the position of engineer members of the State Water Storage and Flood Commission of New York. Mr. Johnson is consulting engineer of the Niagara Hydraulic Power & Mfg. Co. and the Shawinigan Falls Power Co.

Chas. L. Miner, manager of the Chicago branch of Matthew Addy & Co., of Cincinnati, will be married Thursday, June 16, to Miss Edith Richardson, of Chicago. Mr. Miner will be away from his office for a month.

The Wolverine Motor Works, Grand Rapids, Mich., which recently increased its capital stock from $50,000 to $100,000, will erect a suitable plant for the manufacture of "Wolverine" engines from 3 to 100 h. p. The company now is not able to announce details regarding construction or equipment in the proposed new plant, as the increase of capital was so recent that it has not had time fully to develop its plans.

The Hyde Tool Co., of Syracuse, N. Y., has finished its new foundry building, and expects to push the work on the other buildings so that they will be ready for occupancy before long.

PRESIDENT W. T. GRAHAM RESIGNS.

(Special Telegram.)

PITTSBURG, June 15.—William T. Graham, president of the American Sheet & Tin Plate Co., has tendered his resignation, effective July 1. His successor is not yet named. Owing to the number of available officials of the company that could succeed to the position it is a difficult matter to venture a guess. C. W. Bray and E. W. Pargny are both available, while George G. McMurtry and W. P. Bache are spoken of, though Mr. McMurtry would hardly accept a position requiring a Pittsburg residence. Mr. Graham will probably become president of the American Can Co. F. A. Assman, the present incumbent, is now in Europe for his health and F. S. Wheeler is acting president. Mr. Graham is one of the original exponents of the consolidation idea among steel companies. He advanced, through a number of smaller consolidations, from a clerkship to the presidency of one of the leading subsidiary companies of the United States Steel Corporation. His first connection with the iron industry was in a minor capacity with the Aetna Works at Bridgeport, O., the officials of which built the Standard Iron Works and later consolidated the two under the name of the Aetna-Standard Iron & Steel Co. In 1892 this company absorbed the Junction Iron & Steel Co., which was a consolidation of the Laughlin & Junction Steel Co., and the Junction Iron Co., having blast furnaces and steel works at Mingo Junction, O. At this time Mr. Graham was one of the leading officials of the Aetna-Standard Iron & Steel Co. In 1898 the American Tin Plate Co. was organized, taking over the standard black plate mills of the Aetna-Standard Co., which were later removed, and Mr. Graham was elected second vice president, but remained active with the Aetna-Standard Co. The National Steel Co. was next organized and took over the blast furnaces and steel works of the company at Mingo Junction so that the sheet mills alone remained. Mr. Graham was elected one of the officers of this consolidation. When the American Sheet Steel Co. was organized the sheet mills of the Aetna-Standard plant were taken over, and Mr. Graham went to Chicago and became active in the affairs of the American Tin Plate Co. as second vice president. Later he became first vice president and in time succeeded Daniel G. Reid as president. Six months ago the American Sheet Steel Co. and the American Tin Plate Co. were combined and he became president of the American Sheet & Tin Plate Co.

Blue Book of the Iron and Coal Trades.

The second edition of the "National Iron and Steel, Coal and Coke Blue Book," published by R. L. Polk & Co., Pittsburg, and edited by B. H. Morwood, has been issued. The present volume contains a number of new features in addition to those of the first edition, but the same general style of information is continued. Among the new features are the date of incorporation and the amount of capital stock of incorporated companies. The cross reference plan, giving the name of the company as formerly known and showing the title of the company which has absorbed it, has been elaborated. The names of all officers and directors are now given in alphabetical order as well as in connection with the companies. Plants are grouped by states and arranged alphabetically, showing what each company or firm produces. The iron and steel manufactories follow in alphabetical order regardless of location, with descriptions of the plants, showing equipment, tonnage capacity, shipping facilities, etc. An index of the advertising pages is also given.

The Lackawanna Steel Co., Buffalo, completed its third 600-ton blast furnace on the 8th inst. and placed it in operation. Three additional furnaces of the same daily capacity are in course of construction and it is expected will be finished and in running order by the first of next year. All of these furnaces are operated by gas engines. The plant was inspected by Acting President Moses Taylor and a number of directors on the 10th and much gratification was expressed at the satisfactory progress being made in the construction of the company's large plant.

NEW ENGLAND FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the New England Foundrymen's Association was held at the Exchange Club, Boston, on Wednesday, June 8, with B. M. Shaw, president, in the chair. Application for membership was received from the Tabor Mfg. Co., Philadelphia, Pa., and was acted upon favorably. The secretary was instructed to send a telegram of greeting to the members of the association attending the convention of the American Foundrymen's Association at Indianapolis.

Announcement was made that the July meeting would be held in the way of an outing, probably at Point Shirley.

After a short intermission dinner was announced, after which the president introduced O. P. Briggs, of Minneapolis, commissioner of the National Founders' Association, who addressed the association on "The Apprentice Question as Related to the Foundry Business." The address will appear in our next issue.

There was a brief discussion on the subject presented by Mr. Briggs, reference being made by two of the speakers to the apprentice systems followed by the Brown & Sharpe Mfg. Co. and the B. F. Sturtevant Co. Special attention is paid by both these companies to the training of apprentices. Lectures are given and literature distributed among them. The Brown & Sharpe Mfg. Co. employs a man whose time is given entirely to the apprentices in the different departments of the work. He is expected to find boarding places for them, if necessary, and to visit them in case of sickness. Boys taken on as apprentices must have at least a grammar school education. The apprentice is given an eight weeks' trial in the department he desires to enter, and, at the end of that time, if an arrangement is mutually satisfactory, a contract for three years is entered into, dating from the time the apprentice started.

The meeting adjourned at 9:10 p. m. The following were in attendance:

O. P. Briggs, commissioner National Founders' Association.
Geo. B. Buckingham, Arcade Malleable Iron Works.
B. M. Shaw and W. H. Lucas, Walker-Pratt Mfg. Co.
Geo. H. Gibby and W. H. Stafford, Gibby Foundry Co.
F. F. Stockwell, Barbour-Stockwell Co.
Jas. F. Lanigan, Davis Foundry Co.
Wm. C. Doherty, Doherty Bros.
J. P. Barstow, Barstow Stove Co.
John Nelson, Worcester, Mass.
C. Hitch Jr., American Tool & Machine Co.
A. L. Lovejoy, Becker-Brainard Milling Mach. Co.
C. A. Reed, N. S. Bartlett & Co.
J. E. Plimpton, Norwood, Mass.
W. H. Bense, Kinsley Iron & Machine Co.
F. J. Stewart, Jas. Stewart & Co.
W. J. Breen, Hugh W. Adams.
E. A. Tutein, Crocker Bros.
A. W. Gibby and H. E. Gibby, Mechanics Foundry Co.
P. Shields, Shields Foundry Co.
C. R. Fitch, The Stanley Works.
E. V. Hazard, Old Colony Foundry Co.
Geo. F. Pero, Chapman Valve Co.
L. N. Perrault, B. F. Sturtevant Co.
R. H. Penney, S. M. Thompson and T. C. Wilson, Barbour-Stockwell Co.
T. R. Scott, Brown & Sharpe Mfg. Co.
W. M. Saunders, Saunders & Franklin.
W. H. Coffin, Springfield Facing Co.
Geo. H. Lincoln, G. H. Lincoln & Co.
Wm. Harvie, Vaughn Machine Co.
A. O. Smith, G. A. Locke and A. B. Herrick, Smith & Wallace.
F. G. Scholfield, Kabley Foundry Co.
C. C. Boyden, Matthew Addy & Co.

In connection with the article on page 104, in our issue of June 2, describing the performance at the Tioga Steel & Iron Co.'s plant, Philadelphia, of the Taylor-Newbold saw, with inserted cutters treated by the Taylor-White process, mention was omitted of the machine on which this blade was tired. It was manufactured by the Newton Machine Tool Works, of Philadelphia, and it is noteworthy that this machine, while built only for ordinary blades, was capable of driving this blade that in a two-weeks' test was found to increase the cutting capacity from eight to ten times, and that, too, after the machine had been in use for a number of years.

The Ella blast furnace, West Middlesex, Pa., owned by Pickands, Mather & Co., was blown out last week on account of a lack of orders.

MOLDING MACHINES AND THEIR USE.*

BY E. H. MUMFORD, PHILADELPHIA.

It is not my purpose to describe or to advocate any particular molding machine to the exclusion of others. There is use for all. If there is any trade under the sun to which it is impossible to adapt one single machine, or one mechanical process, it is that of molding for metal castings, from patterns as chaotic in outline and dimension as are the brains that originate them, in the one material of the universe, which from Scriptural times on has been the symbol of instability and fickleness. When the molding machine art shall at length be finally and fully developed, it is probable that the aggregation of machines responding to its demands will be similar to the disarray of flasks, core arbors, bottom plates, and other bric-a-brac of the foundry of antiquity; and I venture to suggest that some of the machines now heralded as world beaters, and bolstered by everything except success, will be relegated to the stacks of brilliant ideas which then as now will occupy dusty and unmarked graves in foundry yards, their fast disintegrating skeletons protruding.

Some things are called molding machines which almost lack the number of parts to comply with the definition; for instance, a snap flask and the usual match, with a vibrator frame and a vibrator, is the most universally applicable hand molding machine for small work that I know, yet all that has been added to the flask and the match to make this apparatus a machine is practically one piece, which need not weigh more than six or eight pounds, so far as its operation is concerned. From this to some of the elaborate process machines which have been developed for molding specialties, the side bays of the foundry are lined with mechanisms, the mere naming of which would make a paper by itself; and yet the field of molding in sand is not more than half explored. As one man has put it, the surface of the trade in molding machines has hardly yet been scratched. When it is plowed and sown and fertilized with an intelligent appreciation of what the molding machine can accomplish, and the energy to make it accomplish this, the resulting crop will keep the molding machine factories busy as they never have been; but no one machine will do the ploughing, nor will one man's brains conceive all the machines that will be required.

I make no attempt to illustrate molding machines, for the reason that it evidently would be impossible to illustrate all, or even the types of them. And in the remarks which follow I do not mean to refer to the well known special machines which are used for molding such things as cast gears, pulleys, bathtubs, water pipe, etc., for which the machine is built around its work, and in many instances consists largely of the patterns and their special arrangement, as in the case of a pulley machine adapted to molding pulleys ranging in size from, perhaps, 10 inches to 30 inches on the same machine, with every conceivable width of face in these diameters, on which the patterns represent probably two-thirds of the weight and nine-tenths of the cost of the total machine.

As I have said, the simplest hand molding machine I know is the vibrator frame, with its vibrator attached, guided in the pins of a snap flask and used in connection with a match of the ordinary description, whether of wood, metal or a litharge mixture. In such a frame any two-part pattern, which would ordinarily be molded in a snap flask, may be fitted and rammed up, cope and drag, by hand. For a flask, say 12 inches by 16 inches, the total weight of this machine is not more than 20 pounds, including the flasks, and the whole thing can be hung on the wall. Put this with a hand squeezer, and it is still a hand molding machine. Put it with a power squeezer, and it becomes a power molding machine. Strictly speaking, the vibrator constitutes it a power machine, though the ramming is done by hand; but in a foundry where compressed air is piped about the shop (and foundries where it is not are now exceptions), a hose to a vibrator seems hardly a power connection.

Next in point of simplicity, so far as the machine is concerned, comes the hand-ramming, stripping-plate apparatus, in which by many varying forms of linkage a pattern support is moved vertically, while a frame of some form supports a strip-

*Read at the Indianapolis meeting, June, 1904, of the American Foundrymen's Association.

ping plate through which the patterns are drawn. The mechanism by which the patterns are manipulated and the forms and materials in which the stripping plates are made are now very numerous, and, except for the expense of the stripping plate, and the necessity for attaching the patterns to separate support, there is no more generally useful molding machine made. By a slight modification in the construction of the last mentioned hand-ramming, stripping-plate mechanism, it is possible to use the same machine for either stripping plate or vibrator molding, according to the nature of the work. Thus a man might have a deep spur gear on such a machine in which stripping the pattern was a *sine qua non*, and the next hour he might wish to mold on the same machine a crank or a valve or a valve wheel. This could be done by attaching half a split pattern to a flat plate resting on the same support which previously carried the stripping plate patterns, and placing on the frame, which before carried the stripping plate, a flask frame containing the guiding pins for the flask. The special construction referred to in this machine is one which differentiates vibrator machines from machines on which vibrators might be used by attaching them to one part or another of the machine, but by which attachment the flask and the mold itself would be as much agitated as the pattern which alone one wishes to affect. This construction, which is fully protected by patents, consists in an independent and elastic support for the pattern, so that this vibration does not extend to the sand, which would otherwise be more or less demoralized in the pattern drawing.

Perhaps, as I have begun with the simpler machines, it would be well to speak next of the squeezer, as it has been known for years. These machines are so well known, and so much in evidence everywhere, and have been for so long, that it is hardly more than necessary to mention them. We have all seen the evolution, which took years to effect, in these squeezers, changing the relatively inefficient side lever, nearly vertical in ramming, to the almost ideal horizontal lever, which even a lazy man can make work by sitting on it. These squeezers have been fitted with auxiliary apparatus, such as stripping plates, flasks, lifters, variable tucking blocks, and sprue cutters *ad libitum*, until the hand squeezer equipment seems to have been as intelligently treated as any in the molding machine business.

It is not a far step from pulling a lever by hand to making a cylinder do it, and there are now forty or fifty machines in existence in which the operator "presses a button" with his hand, and rams a mold, and then presses another button with his knee and draws the patterns.

Not more than half the patterns in use may be economically molded by machinery without rolling the drag flask over, and stripping plate and vibrator, hand and power machines of many forms are now made to do this. When a pattern is drawn up, there is less excuse for a stripping plate than when a pattern is drawn down, and with four powerful vibrators acting on a follow board, deep and difficult "blind lifts" are easily made. When stripping plates are used, they may be operated by the machine, or they may be left to follow the sand by gravity. Gravity stripping plates are very old, but now and then they are reinvented much as a new house is made out of an old one by a coat of paint. If the color is sufficiently startling, you forget the old house in your amazement at the new.

It is nearly twenty years since a thoughtful foundryman jar-rammed the first mold mechanically, and it will not be long before most of the deep machine molding now being rammed by hand is jar-rammed by machine.

I have but skimmed the surface of a wide new landscape, calling attention to a few prominent objects in a "bird's-eye view" of the new territory of the molding machine. Foundrymen are watching keenly the development of this, to many of them, yet undiscovered country. They have money to invest; they see wonderful products of the region, and wonder what they need to cure them of the tired feeling we all suffer when we see that others are enjoying what we miss.

It is related of John Ericson that he did not allow physicians to prescribe for him. He would use the doctor's answers to his questions to diagnose his own case. Then with the entire pharmacopeia applicable to his case symptomatically labeled by the learned man, Ericson helped himself to his remedy. So, let me suggest that when you feel that you are suffering from what I might call mechanical prostration, you call in the open-minded practitioner with no hobby to ride, and quacking no patent medicine a cure for all your ills; see what there is to choose from, and diagnosing your own mold, make your own selection of apparatus. Regard whatever money you spend for the purchase of molding machines as only the beginning of your investment. The cost of fitting the patterns to the machines comes after that, and you should not so order your machines as to be obliged to fit you patterns in only one way, and that perhaps the most expensive and most limited in application.

Anyone can buy molding machines; few use them to best advantage. Nothing is doing more to develop the mechanic in the foundry foreman than the molding machine, and the success or failure of either today marks the rise or fall of both in foundries which should use machines.

Obituary.

Herbert Thickett, aged 47 years, died in Pittsburg, June 13, of tuberculosis. Born in England, he came to this country at an early age and became identified with the steel casting industry when it was in its infancy. He was connected with the Sharon Steel Casting Co., which was absorbed by the American Steel Castings Co., and was appointed manager of the Sharon, Alliance and Pittsburg branches. Later these properties were absorbed by the American Steel Foundries and he was appointed department manager of sales, holding this position until recently, when he was compelled to resign owing to ill health.

C. H. Bretting, a manufacturer of saw mill machinery at Ashland, Wis., died May 31 in St. Louis, to which city he and his family had gone to visit the World's Fair. Mr. Bretting was 50 years of age.

Henry H. Hendricks, of the firm of Hendricks Bros., metal dealers, of 49 Cliff street, New York, died May 27. Mr. Hendricks was 44 years old. He was a member of the Engineers' Club and was well known in business circles.

Wm. H. Staake, trustee in bankruptcy of the Saxton Furnace Co., with blast furnaces at Saxton, Pa., advises us that while an appraisement of the Saxton property has been made, the newspaper report that there would be an early resumption of the operation of the furnaces is not true. There is no definite indication of the outcome of the financial troubles. The appraisal is $450,000, which includes besides the two alternate stacks at Saxton, three mines, a quarry and the rolling mill at Coatesville, Pa.

The Republic Iron & Steel Co., Youngstown, O., is making plans for employing the direct metal process at its Bessemer plant. Tracks are to be laid from the Hannah and Haselton furnaces to the Bessemer plant and the hot metal is to be taken direct to the mixers at the steel plant in ladles, instead of casting the iron in pigs and remelting in cupolas, which is the present practice. The new arrangement will enable the company to reduce the cost of steel manufacture to a considerable extent.

A recipe to prevent rust is as follows: Dissolve one ounce of camphor in one pound of melted lard. Remove the scum. Mix as much black lead with the lard and camphor as will give it an iron color. Clean the machinery well; smear with the mixture. After 24 hours rub off. Clean and polish with soft cloth.

A new foundry will be added to the structural iron works plant of the Hansell-Elcock Co., Chicago, Ill.

The Springfield Bridge & Iron Co., Springfield, Ill., recently increased its capital from $10,000 to $35,000 and expects to do some extensive building this year, but is not ready to announce details of its plans.

The Bessemer plant of the Republic Iron & Steel Co., Youngstown, O., is again shut down this week.

Scrap Iron Specifications.*

BY W. G. SCOTT.

"Scrap iron" is the name usually given to the miscellaneous collection of broken and worn out castings used along with pig iron in making foundry mixtures. Strictly speaking, the term applies more appropriately to the conglomeration of iron known as "foreign scrap" or that which is obtained from the junk dealer, who makes a business of collecting such material. Home scrap consisting of gates, sprues, risers, defective castings, and "shot iron" is more properly termed "the remelt," and at the present time where most foundry mixtures are made by analysis, its composition is not considered as an "unknown quantity." The object of this paper is a general classification of the material known as "foreign scrap" which at the present time, in many cases, is purchased by specification.

Under the head of foreign scrap may be included the following kinds of material, viz.: Gray iron, chiled irons, malleable iron, cast borings, steel, wrought iron, and steel or wrought iron borings. The common gray iron cupola founder will prefer a good grade of gray iron scrap; the malleable iron founder may wish to include steel scrap; the Mitis metal maker will want wrought iron, and the cast steel producer may require something else, therefore the necessity of a general classification. The writer has been requested by several large manufacturing concerns to classify the material in such way that it may be controlled by specification if desired, but as a rule such classification can only be brought about by the purchaser insisting upon the agent or junk dealer sorting the scrap, or in case it is not sorted, to claim a rebate before paying for the material. It is proposed to classify foreign scrap as follows:

(1) Light machinery scrap (gray iron).
(2) Heavy machinery scrap (gray iron).
(3) Stove plate scrap (gray iron).
(4) Car wheel and chilled iron (gray iron).
(5) Cast borings.
(6) Malleable iron scrap.
(7) Steel scrap.
(8) Wrought scrap.
(9) Mixed scrap.

It is impossible to establish a cast iron rule, or to formulate a rigid specification in regard to the classification of scrap, as such a course would have a tendency to raise the price of the better grades and force the culled material upon the small foundries.

It is proposed to briefly describe the kind of material suitable for each particular class, explain its proper use, and give a general average analysis of the iron or steel.

1. Light Machinery Scrap.

This class of scrap will usually consist of the broken parts of agricultural implements, sewing machines, ornamental iron work, cast fixtures, etc. Most of the material will be less than two inches in thickness, except certain portions like the hub of a wheel, or perhaps a large support; as a rule, however, the iron will be thin and consequently should oe soft. The average analysis of light scrap will generally be found to be within the following limits:

Silicon	2.00	to	2.60	percent
Sulphur	.075	to	.095	percent
Phosphorus	.70	to	.90	percent
Manganese	.20	to	.60	percent
Total carbon	3.00	to	4.25	percent

Light machinery scrap is considered superior to all other grades for general gray iron work. It increases the strength of soft iron mixtures and produces but little slag, unless much rust be present, in which case it has a tendency to harden the iron somewhat and increases the "melting loss," the rust uniting with the slag to form silicate of iron which is an undesirable element in good cupola practice. The proper amount of scrap to be used in melting will, of course, depend upon the quality of castings desired. The usual amount is from 30 to 50 per cent, but with a medium low sulphur and the desired silicon there is no objection to an unlimited increase. Some foundrymen use all scrap with a little ferro-silicon softener and a small amount of ferro-manganese, but such mixtures are uncertain and cannot be controlled by analysis or otherwise. Increase in scrap means decrease in total carbon, hence the iron becomes harder, stronger and more close grained. Light machinery scrap, if sorted, costs almost as much as pig iron, therefore in most cases the buyer makes no distinction between light and heavy machinery scrap, merely specifying that no large pieces shall be included. The following specification covers this point:

SPECIFICATIONS FOR MACHINERY SCRAP.

Under this specification is desired a good, clean scrap iron, such as agricultural implements and light machinery scrap. The scrap must contain no wrought iron, steel, stove plate, grate bars, car wheels, brake shoes, chilled roll, etc. Malleable scrap is objectionable, also an excess of rusty iron. Large pieces weighing more than 400 pounds will not be accepted. When a car of scrap is received the inspector will superintend the unloading and discard the following objectionable material, viz.: Wrougnt iron pieces, steel, burnt stove plate, grate bars, car wheels, brake shoes, large chilled work, burnt malleables, and large pieces weighing more than 400 pounds. Rejected scrap will be deducted from the total weight of scrap received, and payment made only on accepted material.

2. Heavy Machinery Scrap.

As the name implies, this scrap will consist of large pieces from fly-wheels, engine beds, large pumps, blowing machinery, mining machinery, gears, cast die blocks, mill castings, architectural castings, etc. The pieces may weigh several tons or may be broken into sma.. pieces, in any event the pieces will naturally be large and heavy, consequently will be too large for the ordinary cupola. The breaking of heavy castings is a serious problem and not only involves an extra amount of work, but adds to the expense. The average analysis will usually be found to be within the following limits:

Silicon	1.60	to	2.20	percent
Sulphur	.075	to	.150	percent
Phosphorus	.40	to	.80	percent
Manganese	.30	to	.90	percent
Total carbon	2.75	to	4.00	percent

Heavy scrap is generally used for heavy work, and should be melted in a large cupola. The amount varies from 20. to 60. percent, but should not exceed 50. percent if the iron is mixed by analysis and the castings are to be made by specification. Where the resultant castings are not made under specification any amount may be used, providing enough silicon be present to insure a fairly soft iron for machining. Specifications for heavy scrap are worded as follows, viz.:

SPECIFICATIONS FOR HEAVY CAST SCRAP.

Material purchased under this specification is understood to belong to the class of cast iron known as "heavy scrap" consisting of bed plates, gears, wheels, supports, engine parts, cast pipe, heavy machinery, etc. The following material is objectionable and will not be accepted, viz.: Burnt annealing pots, burnt furnace castings, wrought iron or steel shafts, steel plate, sheet iron, galvanizing iron, etc. Such material will be thrown aside and payment made only on the accepted scrap.

3. Stove Plate Scrap.

New stove plate is considered as an excellent soft scrap on account of the high silicon, graphite, and phosphorus content. Old stove plate, containing burnt iron and an unlimited amount of rust, is objectionable, and many foundrymen will not use it at all. Old stoves and furnace castings which have been in use for years are generally pretty well "burnt" and consequently are high in sulphur and low in graphite. New stove plate is scarce and high in price, while old stove plate is cheap; therefore very little of the former article is found in the scrap now on the market. No specifications calling for *new* stove plate scrap would be effective, as it is almost impossible to get such a grade. The only specification that we know of makes no such distinction, but deals with the ordinary mixed scrap in the following manner:

SPECIFICATIONS FOR STOVE PLATE SCRAP.

The scrap purchased under this specification is assumed to be a soft cast iron consisting mostly of *broken* parts of stoves and furnace castings. An admixture of light machinery scrap is permissible, but parts of stoves from the fire box are objectionable, also pieces which are badly warped or burnt. On

*Read at the Indianapolis convention of the American Foundrymen's Association, June, 1904.

receipt of a shipment or load of stove plate scrap the material will be sorted and the "objectionable" material laid aside. The purchaser retains the right to reject such material, or to accept it at a reduced price, providing it may be made into grate bars, sash weight, etc. It is distinctly understood that this latter clause be optional with the purchasing agent. It will be seen from the above specification that there is a serious objection to burnt iron, yet there is a desire to keep such poor material providing the price is right, and we are inclined to think that all of the burnt iron is not made into sash weight. Taking the average run of stove plate scrap, including a small amount of fire box parts and other objectionable pieces, the material will generally analyze within the following limits:

Silicon	2.30	to	3.30	percent
Sulphur	.075	to	.135	percent
Phosphorus	.45	to	1.25	percent
Manganese	.20	to	.70	percent
Total carbon	3.50	to	4.50	percent

There is a wide variation in the above, but it must be remembered that there is a vast difference in the composition of new and old stove plate scrap; furthermore that one founder believes in high phosphorus and silicon, whereas another might think the desired fluidity could be obtained with a high carbon and silicon; both, however, adhere to the high silicon idea. High phosphoric iron is easily fusible, while high graphite iron is the reverse, consequently the latter mixture is now favored. The following analysis of new stove plate and the same material after two years' usage illustrates the difference in composition:

	New Material.	Old Material.	
Silicon	2.60	2.52	percent
Sulphur	.089	.117	percent
Phosphorus	.720	.731	percent
Manganese	.30	.21	percent
Combined carbon	.20	.42	percent
Graphite carbon	4.00	3.56	percent

The piece in question was said to be part of the fire box and the claim is made that the great increase in sulphur was due to the absorption of sulphur from the coal; evidently, it must have been a poor grade of soft coal.

4. Car Wheel and Chilled Iron Scrap.

Car Wheel Scrap is a very desirable material for strong and hard cast iron mixtures. The only objection to this class of scrap for use in the ordinary foundry is in the size of the pieces and the labor required to break the wheels into sufficiently small pieces. A 1,000-pound weight dropping 10 feet is hardly sufficient to reduce the large wheels to proper size, consequently repeated blows are required and much time consumed. A larger weight or higher drop is more effective, but very few foundries are supplied with the proper apparatus. For large work and with a large cupola the trouble is not so great. "Car wheel scrap" is considered a superior grade of cast iron on account of the low phosphorus content and consequent strength. The following specification gives a good idea as to the quality of cast iron which may be included in this class:

SPECIFICATIONS FOR CAR WHEEL AND HARD IRON SCRAP.

The following material will be accepted under this specification, viz.: Cast iron wheels; chilled iron rolls, gears, grinders, etc.; semi-steel castings; cast iron gun metal; steam cylinders, etc. Brake shoes, malleable iron, car scap, journal boxes, etc., are not desired. Steel castings and die blocks are also objectionable unless especially specified. All undesirable material will be sorted out, and may be rejected, or retained if found to be in accordance with our specifications for such other class of scrap. The sorting of material will be superintended by the inspector and payment made in accordance with the class of scrap received. Specifications for scrap iron are liable to be drawn too rigid, but the desire to obtain a class of scrap suitable for certain specified purposes is an excuse which must not be overlooked.

Car wheel and hard iron scrap, although very desirable for certain classes of work, must be used with caution in ordinary foundry mixtures, as the low phosphorus and silicon have a tendency toward sluggish iron or lack of fluidity. There is quite a variation in the chemical composition of car wheels, chilled rolls, semi-steel, etc., belonging to this class of scrap, but the following limits will be of a close approximation:

Silicon	.50	to	1.75	percent
Sulphur	.075	to	.150	percent
Phosphorus	.30	to	.65	percent
Manganese	.30	to	.90	percent
Total carbon	2.00	to	3.75	percent

If semi-steel were not included in this class the average analysis would correspond closely with that of a good cast iron car wheel mixture.

5. Cast Iron Borings.

Cast borings can hardly be considered as a legitimate scrap iron, and as a rule are not desired by the foundryman. On account of the fineness of the particles much of the iron is lost in melting either by being burned up or oxidized, or uniting with the slag. In some cases the loss exceeds 30 percent, and under the most favorable conditions is seldom less than 10 percent. Numerous methods have been tried in melting borings, one of which is to inclose them in strong pine boxes and charge in the cupola along with the pig iron. Another method is to enclose them in sheet iron boxes, but this is somewhat expensive and not very satisfactory. Borings made into briquettes with pitch are not a success, as the binder melts too easily. Briquetted with lime, salt, cement, etc., this defect is overcome, but other objectionable features are presented, in which the excess of rust, due to the water introduced, is a serious objection. The amount of metallic iron in a good cement bound briquette seldom exceeds 80 per cent, if, however, we include the graphite, manganese, etc., the total considered as pig iron would not exceed 88 percent, thus leaving at least 12 percent of residue which goes into the slag. The amount of binder or cement is usually about 5 percent, while the remaining 7 percent consists of iron oxide, water, dust etc. Briquettes have been made with more iron than above stated, but actual experience has proven that the regular run of such material is similar to the above figures. Good results are obtained by melting 10 to 20 percent of briquetted borings with regular scrap and pig iron. Briquettes melted alone produce an excess of slag and bung up a cupola so that it is almost impossible to draw off the iron.

The ideal method of melting borings is by means of an air furnace or the open-hearth furnace, in which event the iron takes up very little sulphur, although there is quite a loss from oxidation. Borings melted in a cupola (using the material packed in wooden boxes) is as good a method as any yet devised in general foundry practice, but there is considerable loss or waste and a large increase in the sulphur content. Borings showing an analysis .085 percent of sulphur, melted with foundry coke (containing .80 percent of sulphur), will produce an iron containing .120 percent of sulphur. Borings mixed with tap cinder and ore produces an inferior quality of pig iron, and fortunately there is very little of it on the market.

The only specification we know of for this class of material reads as follows:

SPECIFICATIONS FOR CAST IRON, STEEL AND WROUGHT BORINGS.

In making contracts for borings it is stipulated that the manufacturer, machine shop, or iron mill superintendent, see to it that the different kind of borings, punchings, etc., be stored in proper bins and covered in such manner as to exclude rain and snow. Separate bins must be provided for cast iron borings; steel borings, punchings, etc.; and for wrought iron borings. In case the borings are mixed a reduction in price previously agreed upon will be made. Borings freed from oil by means of a centrifugal machine or similar device will be paid for at the price affixed in the contract. In the above specification the last clause relating to oil seems rather superfluous, as most manufacturers consider the oil more valuable than the borings and endeavor to save it. The average analysis of the three different kind of borings may be approximated quite closely, but the variation is necessarily great.

Variable Analysis of Cast Iron Borings:

Silicon	1.50	to	3.00	percent
Sulphur	.075	to	.165	percent
Phosphorus	.30	to	1.25	percent
Manganese	.20	to	.90	percent
Total Carbon	2.50	to	4.50	percent

Variable Analysis of Steel Borings:

Silicon	.00	to	.50	percent
Sulphur	.015	to	.095	percent
Phosphorus	.015	to	.18	percent
Manganese	.10	to	1.00	percent
Combined Carbon	.10	to	1.50	percent

Variable Analysis of Wrought Iron Borings:

Silicon	.00	to .15	percent
Sulphur	.008	to .045	percent
Phosphorus	.011	to .35	percent
Manganese	.00	to .15	percent
Carbon	.00	to .10	percent

6. Malleable Iron Scrap.

There is very little call for malleable iron scrap among the gray-iron founders and the malleable iron men are somewhat adverse to using anything except that which they are familiar with, especially in the annealed form. White iron is not to be had, as the malleable iron founder can use all the sprue he can make, providing it is of good quality, otherwise some of it may occasionally be found on the market. Saddlery Hardware is generally a pretty good class of scrap, but it is so small in size that there is never a great accumulation. Burnt annealing pots, over-annealed iron, burnt sprue, etc., is an objectional class of material, but it is frequently used for sash weights, grate bars, etc. The loss in melting burnt iron, scale, and rust, is, however, so great and the resultant casting so poor, that it is a question if such work pays. We know of no printed specification for malleable scrap, but nearly every class of scrap from light machinery to car wheel generally contains various amounts of malleable iron castings either large or small, and it is simply impossible to make a fine distinction in the matter. A reasonable amount of malleable iron in gray iron scrap is seldom objected to. The malleable iron man claims that there is very little malleable iron on the market, as such material never breaks.

The average limits of a malleable iron analysis will be as follows:

Silicon	.30	to 1.75	percent
Sulphur	.035	to .095	percent
Phosphorus	.011	to .22	percent
Manganese	.15	to .50	percent
Total Carbon	1.85	to 4.25	percent

If the total carbon is low the indications are that steel has been used in the mix or that the material has been long annealed. Malleable scrap is not liked by the gray iron founder on account of the low phosphorus and low silicon, both of which reduce the fluidity of molten iron. In gray iron castings it is desirable to use an iron containing not less than .30 percent of phosphorus, and for light castings .70 percent is preferable. In malleable iron mixtures it must not exceed .22 percent, in fact a low phosphorus is desired.

7. Steel Scrap.

Steel scrap is coming into use more and more every day and is in great demand. It used to be considered an impossibility to melt steel in the cupola and have it mix with the cast iron, but nowadays it is common practice and many foundries are melting from 10 to 40 percent of steel scrap. With a little experience in charging, regulating the blast, fuel, etc., perfect mixtures may be obtained. The object in using steel scrap is to reduce the amount of graphitic carbon (in reality it actually reduces the total carbon to a certain extent), thereby producing a hard, strong, close grained iron. Steel scrap is seldom used in soft iron mixtures unless there be danger of "kish," in which event 50 lbs. of steel to a ton of iron is sufficient to overcome the difficulty. With 30 percent of steel, 15 to 20 percent of Home Scrap, and the balance pig iron, estimated so that the resultant castings contain 1.50 to 1.75 per cent, silicon, sulphur not over .075, manganese about .50 or .60, and phosphorus at .40 to .50 per cent., the iron will have a tensile strength of 35,000 to 40,000 lbs. per square inch, and the transverse strength on a one-inch square bar, 12 in. between supports, will be between 3,600 and 4,500 lbs. In charging steel scrap in the cupola it must be borne in mind that no small pieces be used, as such pieces seldom melt, consequently mix with the iron and produce hard spots. Steel Rail cut into 16 to 24-in. lengths are considered the best scrap. The following specification covers the size and other desired points:

SPECIFICATIONS FOR STEEL SCRAP.

Under this specification no distinction will be made between Open-Hearth or Bessemer steel, the main point considered will be in regard to size and general composition. It may be optional with the purchasing agent to order steel rail, steel castings, clippings, or mixed steel scrap. In ordering steel rail it is understood that the pieces are to be cut to a length of not less than 12 in. or longer than 24 in. (16 to 18 inch lengths preferred). In the event of steel castings being ordered, we reserve the right to reject all small pieces, i. e., less than 6 in. in diameter, and extremely large pieces weighing more than 500 lbs. When mixed steel scrap is ordered it is distinctly understood that no small pieces will be accepted, the smallest size being limited to 6 in. in length or diameter in flats, sheet punchings, clippings, etc.

No borings or shavings will be accepted. Mixed steel scrap may include—steel shafting, boiler plate, structural steel, springs, cutlery steel, tool steel, cast steel, rail, machinery steel, etc. Steel scrap will be divided into the three following classes, viz.: (A) Rail Steel, (B) Steel Castings, (C) Mixed Steel Scrap. The purchasing agent will order the material according to this code, and the inspector will see that the shipment is sorted according to class. Payment will be made on this basis only. It will be noticed from the above that the preference is for rail steel. In regard to the other two grades, i. e., steel castings and mixed steel scrap, there is a difference of opinion as to which is the best; some prefer the cast steel, while others like the mixed scrap. The following analysis gives a good idea as to the composition:

Limit Analysis of Rail Steel:

Silicon	.04	to .50	percent
Sulphur	.025	to .125	percent
Phosphorus	.05	to .14	percent
Manganese	.18	to 1.50	percent
Combined Carbon	.20	to .80	percent

Limit Analysis of Steel Castings:

Silicon	.02	to .50	percent
Sulphur	.012	to .065	percent
Phosphorus	.02	to .12	percent
Manganese	.20	to .80	percent
Carbon	.15	to .90	percent

Limit Analysis of Mixed Steel Scrap:

Silicon	.00	to .75	percent
Sulphur	.005	to .125	percent
Phosphorus	.005	to .25	percent
Manganese	.10	to 1.50	percent
Carbon	.10	to 1.50	percent

The great variation in mixed scrap may be accounted for from the fact that this class of material may contain a mild steel with .10 percent of carbon or a die block of tool steel with 1.50 percent of carbon. Tungsten, chromium, molybendum, etc., used in self-hardening steels, is not considered in the above analysis, as the percentage of tool steel in scrap is extremely small. The rapid cutting tool steels which are usually hardened in a blast of air, belong to this class and contain from 1. to 20. percent of tungsten, with from .25 to 4.50 percent of chromium.

Unless the tool steel is burnt or otherwise damaged, it would be folly to consign such material to the scrap heap. An unfinished die found in the scrap heap was analyzed out of curiosity and found to be a superior grade of "high speed" tool steel. The tool maker evidently did not know how to work the metal and probably condemned it as being no good.

The analysis was as follows:

Silicon	.22	percent
Sulphur	.011	percent
Phosphorus	.011	percent
Manganese	.12	percent
Carbon	.52	percent
Tungsten	18.00	percent
Chromium	3.30	percent

In the analysis of the different kinds of scrap the aim has been to include the variation of extremes, consequently for practical purposes it is customary to add the two extremes and divide by 2 for an average, thus: The variation in sulphur being .025 to .125, the average would be .075 percent, which is close enough for estimating the first mixtures when starting out with a change of scrap.

8. Wrought Iron Scrap.

There is very little call for this class of scrap. It is used in a limited way in the manufacture of Mitis Metal, which once was in demand, but has since been forced aside by the modern steel castings. The high melting point of wrought iron excludes its use in the cupola, although some foundry-

men still use a small amount (20 lbs. wrought iron to 2,000 lbs. of pig) to prevent "kish." Steel scrap answers just as well and is more easily melted. The following specification defines the use of wrought iron in the manufacture of re-rolled or commercial refined iron:

SPECIFICATIONS FOR WROUGHT SCRAP.

The following material will be accepted, viz.: Wrought iron rods, shafts, girders, beams, heavy hoop irons, horse shoes, heavy iron wire, spikes, wrought nails, rivets, bolts, flat wrought bars, and other wrought iron material excepting borings, tacks, nuts, washers, etc. Steel is not desired, but the material will not be rejected on account of a small amount of steel welded or fastened to the wrought pieces. Rounds, flats, horse shoes, large rivets, heavy wire, etc., are preferred. Scrap containing washers in quantity or other small pieces will be accepted only at a reduced price.

General Analysis of Wrought Scrap:

Silicon	.008	to .15	percent
Sulphur	.008	to .045	percent
Phosphorus	.011	to .35	percent
Manganese	.00	to .10	percent
Carbon	.00	to .10	percent
Graphite	.00	to .05	percent
Slag	.01	to 1.20	percent

An ideal wrought iron should be low in everything but pure metallic iron. With manganese or carbon above .10 percent, it inclines to become steely; sulphur makes it red short, and most specifications limit this element to .04 percent. Phosphorus should be below .10 percent, carbon the lower the better, graphite is objectionable, and an excess of slag shows that the iron has not been sufficiently worked. The re-rolled or commercial refined iron made from scrap always contains more or less steel, consequently such iron is higher in manganese, carbon and sulphur than the regular puddled wrought iron. This material generally has a high tensile strength, but the fiber is poor; it is therefore unsuitable for stay bolts, rivets, etc.

9. Mixed Scrap.

This class of scrap may contain "any old thing" from tin cans to anvils or cannon. Such material is usually collected by junk dealers and sorted into the following material: Cast iron, wrought iron, sheet iron, brass and bronze, tin-ware, lead and similar metals; also steel, providing the junk dealer is able to distinguish it from iron. The tin is reclaimed from the cans and the remaining iron used for making copperas, melting into sash weights, etc. The lead and brass goes to the bearing metal or Babbitt maker, while the iron is generally sold to the foundry. Much of this iron scrap is good, but as a rule it is poorly sorted and consequently contains considerable wrought iron.

10. General Remarks on Scrap Iron.

At present no fine distinction is made in regard to the classification of scrap by the jobbing foundry, but the large manufacturers are more particular and insist on some form of sorting. Evidently the tendency is along this line and will eventually result in the scrap being carefully sorted by the scrap dealer, resulting, of course, in a scale of prices according to grade.

Every foundryman is inclined to use scrap, preferring it to gray forge at the same price. As a rule a mixture containing scrap produces a stronger cast iron than an all pig mix. There are several reasons for this, one of which is that the graphitic carbon is in a finer state of division than in pig iron. Another idea is that the total carbon is reduced by addition of scrap, which acts like steel in this respect. Steel being free from silicon and graphite, not only reduces the silicon and total carbon in a cupola mixture, but actually favors combined carbon. If a mixture be made from pig iron only, with, say a silicon content of 1.80 percent, all other metalloids being normal; and another mixture be made of pig with, say, 15 percent of steel, the resultant cast iron containing 1.80 percent of silicon and identically the same amount of total carbon, etc., it will be found that the steel mixture will be the stronger, and if heat conditions could be absolutely controlled the combined carbon would be higher. This experiment has been tried several times, and even with the same carbon ratio the steel mix was the stronger iron. This state of affairs may possibly be solved by means of the microscope, hence the "fineness of division" theory will then be made clear. The claim is also made that the difference in strength and closeness of grain in castings made from charcoal and coke pig iron is due to the finely divided form of the graphite in the former pig iron. No matter what the cause, or what theory be accepted, the fact remains that an iron containing scrap will be stronger than an all pig mix. The whole secret of strength in cast iron is conceded to be due to carbon, and is dependent upon the ratio of the two forms, i. e., combined and graphitic. Furthermore this ratio is greatly influenced by the amount of total carbon within certain limits, for example: A sample of cast iron containing 3.50 percent of graphite or graphitic carbon and .50 percent of combined will not have a strength equal to one containing 2.80 percent of graphite and .40 percent of combined carbon, although each one bears the ratio of 1 to 7. This is easy of solution for the reason that graphite has no strength of its own, and any excess present simply reduces an equivalent percentage of metallic iron. In the case cited there was a difference of .70 percent; taking 34,750 lbs. as the actual tensile strength per square inch of pure metallic iron, 70 percent of graphite would make a difference of about 24,000 lbs. When, however, we go to extremes and reduce the total carbon to a minimum the result is a hard, brittle iron; on the other hand, an excess of carbon, especially graphitic, produces a soft, weak iron. Repeated melting will reduce both the silicon and the carbon and eventually result in a white iron. Scrap iron having been melted one or more times is therefore started on this course and would eventually reach the white iron stage if remelted a sufficient number of times. The regular foundry re-melt, known as "Home Scrap," is preferable to a "Foreign Scrap," as its composition is known and the remelting has not been carried too far. Good castings with a high strength may be made from an all scrap mix, providing a little ferro-manganese be added as a cleanser and sufficient ferro-silicon charged to make the iron soft enough to machine. Making an all scrap mix by analysis is a difficult proposition, but it is being done every day and the results are said to be satisfactory.

In conclusion we pray that the "scrap heap" may be more respected in the future, its value recognized, and the good separated from the bad.

Barney & Smith Car Co.

The annual statement of the Barney & Smith Car Co., of Dayton, O., has been made public. It covers the operations of the company for the year ended March 31, 1904, and compares as follows:

	1904-3.	1903-2.	1902-1.
Net profits	$633,553	$566,261	$399,993
Charged off	.....	3,750	26
Balance	$635,553	$562,511	$399,967
Int. on bonds	60,000	60,000	60,000
Balance	$573,553	$502,511	$339,967
Pref. dividends	200,000	200,000	200,000
Surplus	$373,553	$302,511	$139,967

The general balance sheet as of March 31, 1904, compares as follows:

ASSETS.

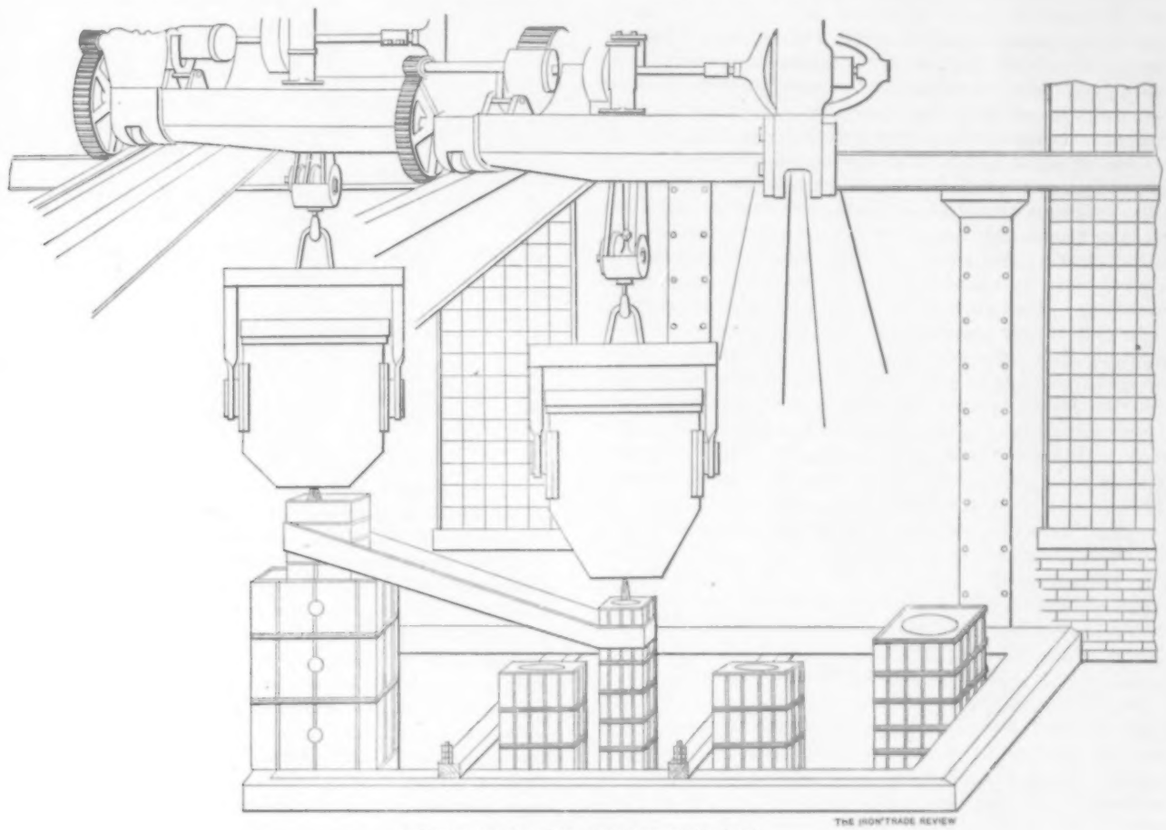
	1904.	1903.	1902.
Real estate, pl. imp., etc.	$3,775,000	$3,750,000	$3,726,274
Machinery on hand	1,036,259	1,585,752	1,309,658
Bills receivable	1,182,367	660,169	365,399
Accounts receivable	469,667	538,869	389,777
Bonds other companies	.....	.....	5,000
Cash	49,470	25,504	10,549
Total	$6,512,763	$6,560,294	$5,806,657

LIABILITIES.

Preferred stock	$2,500,000	$2,500,000	$2,500,000
Common stock	1,000,000	1,000,000	1,000,000
First mortgage bonds	1,000,000	1,000,000	1,000,000
Bills payable	565,976	829,776	296,100
Savings fund	56,681	39,537	30,953
Bond interest	15,000	15,000	15,000
Accounts payable	265,988	440,416	531,550
Profits and loss surplus	1,109,118	735,565	433,054
Total	$6,512,763	$6,560,294	$5,806,657

METHOD OF CASTING A LARGE GEAR RIM.

Mackintosh, Hemphill & Co., of Pittsburg, recently cast a large steel rim for the main gear of a 46 x 60-inch geared reversing engine driving horizontal rolls for the universal slabbing mill designed and built by this company for the Lackawanna Steel Co., of Buffalo. The rim was cast at the Fort Pitt Foundry, Pittsburg, and weighed 70,000 pounds. The rim is 11 feet in diameter at the pitch line and 44 inches in the face. In casting the rim the steel was poured from two ladles, the one pouring directly into the gate while the second poured into a runner leading into this gate. Four sink heads were provided into which the surplus steel was poured. The mill that will be driven by the engine for which the rim was intended is the largest slabbing mill in the world, and required very massive castings for the various parts. When the cast iron center is placed in the rim and the wheel is assembled on the shaft the total weight will be 150,000 pounds. The total weight of the slabbing mill, which the gear mentioned is to drive, is 4,600,000 pounds.



METHOD OF CASTING A LARGE GEAR RIM.

The first formal meeting of the recently organized National Association of Engine and Boat Manufacturers was held June 6 in New York. Representatives of many of the leading firms in this line of business were present. The charter for the National Association, taken out under the laws of the State of New York, was received and a constitution and a set of by-laws adopted. It was announced that the membership roll had been signed by 44 leading manufacturers of motors for vehicles, launches, etc. The election of officers will be held on June 27 at New York. The association will endeavor to secure special freight rates and protect its members against hostile legislation and questionable advertising schemes. A bureau of information is to be established. The association will encourage improved methods in construction and consider the use of alcohol as fuel.

For three consecutive years Conneaut, O., has had the distinction of being the first port along Lake Erie to receive an ore cargo. The third year was added June 9, when the steamer Joliet entered from Ashland with ore.

THE ELECTRIC FURNACE FOR IRON AND STEEL.

BY P. MCN. BENNIE.

The changes in physical state involved in the reduction of iron oxide to metallic iron and the reciprocal reactions of the other substances involved in the industrial production of iron and derived metals require the consumption of a certain amount of energy. In ordinary metallurgy that energy is obtained by the combustion of carbon, while in electro-metallurgy we endeavor to replace this by electrical energy.

Take a map of the United States, and mark with black pins the localities where coal suitable for metallurgical operations is found. Then take red pins and mark where large ore bodies are located. Now, take some other color, green, for example, and mark where iron producing centers have sprung up. You will at once be struck by the fact that the black and green pins are pretty close together, while the red pins are generally off by themselves. There are several factors determining the location and growth of an iron-producing center. By "iron-producing center" is meant the localities where are produced pig iron, steel, blooms, etc., and not necessarily finished products. Such factors are the existence of energy in the form of coal, transportation facilities by rail or water; supply of iron ores, and facilities for getting the products to the market, as well as the nearness of the market. It will be observed that localities which have iron ore in abundance but which are deficient in carbon do not develop as iron manufacturing centers—Lake Superior ore ranges for example. In Canada, where there are good workable iron ores, but a scarcity of fuel, the country is backward in metallurgical industry. Abroad, take Italy, where there are extremely good iron ores, but where fuel is scarce and expensive, and you find that country has been able to make but little use of her ore deposits. On the other hand, Great Britain, which now imports about one-third of her ore, is still third in production of pig iron, following the United States and Germany.

It seems that, generally speaking, the location of iron producing centers has been determined, not so much by the presence of iron-bearing measures, as by the presence of the energy necessary for their reduction and refinement, which in

*Abstract of a paper, illustrated with lantern slides, read before the Foundrymen's Association at Philadelphia, June 1, 1904.

ordinary metallurgy is supplied by coal, coke and charcoal.

Recently we have witnessed, it is true, a partial compromise in this respect, in the growth of iron industries in the vicinity of Buffalo, where the Buffalo & Susquehanna Iron Co. and the Lackawanna Steel Co. have erected enormous plants. But the location of plants there is due to the fact that fuel can be transported very cheaply from the Pennsylvania fields, while ores can be brought by water from the Upper Lakes at minimum cost. Then Buffalo possesses unusually good transportation facilities to the consuming centers by rail and water.

If, however, we are able to replace a portion of the carbon energy by electrical energy, derived from the hydro-electric installations of Niagara Falls, Massena, Sault Ste. Marie or elsewhere, or from utilization of waste blast furnace gases, or from gases produced from anthracite culm, we may then expect to see metallurgical operations carried on under new conditions, and industries spring up in new and unexpected places with relation to supply of raw materials.

However, it must not be imagined that the electric furnace will do anything that is demanded of it, or that it can be successfully applied under all sorts of conditions. That is a common error into which many have fallen, who should know better; even some of those familiar with electrical furnaces have failed to recognize its limitations. The solution of the problem of using electrical heat instead of the heat produced by combustion of carbon may now be considered an accomplished fact, in the technical sense; but as to the economic results, judgment should be withheld until further experience has been gained, although everything seems to indicate success in this respect. The electric furnace can do some things and do them better than any other kind of furnace, but it cannot do everything. From an economic point of view it is necessary to find out in what particular cases the electric furnace can be applied so as to offer advantages over other methods. In the process of gaining this knowledge, there is also being revealed what the electric furnace cannot do, and wherein it does not present advantages of sufficient value to justify its application under ordinary conditions. We have selected some examples of furnaces of various types, as constituting a fairly representative record of achievements up to the present time. It should be borne in mind that although electricity is the most flexible and tractable of the forms of energy, it is a metallurgical agent generally the most costly. It should only be employed, therefore, with a thorough grasp of the conditions; and its use should be restricted to those applications where its superiority is clearly evident.

Greater Progress Abroad.

The application of the electric furnace to iron and steel production has made greater progress in Europe than in America, due partly to economic and partly to accidental causes. In Alpine France, Switzerland and Italy the existence of abundant water powers, permitting the development of hydro-electric power at remarkably low cost, greatly assisted the growth of electrical industry. The scarcity of suitable fuel in those regions also added to the value of these natural sources of energy.

When the calcium carbide industry experienced such extraordinary growth, everybody owning hydraulic power saw visions of wealth, and many hydro-electric plants were put in. Then came a period of over-production of carbide, a decline in price and closing of a number of factories. When the French courts awarded to M. Bullier the sole right to make calcium carbide in France, many other factories were shut down permanently. Some of these works were remodeled and began to make various ferro alloys, such as ferro-silicon and ferro-chromium, for which the electric furnace is well adapted. But the sudden increase in production of these commodities flooded the market, and efforts were made to find other uses for idle and valuable plants.

During this time there was a growing interest in the possibility of using the electric furnace to produce iron and steel, and many able investigators attacked the problem in various ways. Among those whose work may be said to have had an appreciable effect upon the industry may be mentioned: ....., Keller, Héroult, Harmet, and Chavarria-Contardo, in France; Stassano in Italy, Girod in Switzerland and France, and Kjellin in Sweden.

The art of electro-metallurgy, although still young, has progressed so rapidly in recent years that it may justly be said to have passed its youth and to have entered upon a vigorous career. It has now reached the stage where it is diversifying and developing along specific lines for specific purposes. This diversifying tendency has its parallel in the older metallurgy, where the blast furnace produces pig iron, the puddling furnace wrought iron, Bessemer and open-hearth processes their particular grades of steel, crucible furnaces, their special tool steels, etc.

Classes of Electric Reduction and Refining.

From the metallurgical point of view, the application of electrically generated heat to the metallurgy of iron and derived metals may be divided into the following general classes, which we have arranged in the order of their dependence upon present metallurgical practice, No. 1 being designed as an adjunct to blast furnace working, No. 2 as a partially dependent process, while Nos. 3 and 4 are entirely independent.

1. Treatment of molten pig iron as it comes direct from the blast furnace, for the purpose of refining and converting it into steel of certain grades. This may be called the electro-refining of steel.

2. Treatment of cold pig iron, or a mixture of pig and suitable scrap, to produce iron and steel.

3. Direct reduction of iron from its ores, and if desired subsequent refinement into steel as a practically continuous process, beginning with the raw ores.

4. Production of various ferro-alloys, by either of the following methods: (a) Starting with a mixture of iron ores and ores of the metal to be alloyed, or (b) Starting with a mixture of pig iron and minerals to be reduced and alloyed therewith.

Class 1.—Treatment of Molten Pig Iron Direct from Blast Furnace. The electro-refining of molten pig iron direct from blast furnaces or cupolas presents certain advantages over the treatment of cold metal; for instance, the considerable amount of heat contained in the hot metal is utilized. Also, as hot iron has a higher electrical resistivity than cold iron, when it is desired to conduct electrical refining, where the temperature is raised and maintained by Joulean heat, this is more easily carried out by starting with hot metal. For refining purposes, furnaces of the resistance type seem well adapted; that is, where the temperature of the bath is maintained by the generated heat of an electric current passing through the metal itself.

Class 2.—Treatment of Pig Iron, or Pig Iron and Scrap, Starting with the Metals in the Cold State. Electrical furnaces employing this method are generally those in which the high temperature of the electric arc is employed to start the process, and later when a sufficient quantity of molten metal has been produced in the hearth, the current is made to pass through the slag floating on top of the bath. The slag has a higher resistivity than the molten metal and the heat thus generated is taken up by the fluid metal beneath.

Class 3.—Direct Reduction from the Ores. Processes starting with the ores themselves do not seem destined to wide application in the United States. In the present state of development of electro-metallurgy, furnaces can be designed for but limited capacities, compared with modern blast furnaces, and it is doubtful if pig iron or even steel could be produced in electrical furnaces at a sufficiently low cost to justify this class of operations. Where it is desired to refine the reduced iron into steel as part of the process it possesses a greater interest.

Class 4.—Production of Ferro-alloys. This class of furnaces has been applied for a number of years with considerable success, and its value for the purpose is undeniable. It already occupies a permanent place in the metallurgical scheme, as steel makers are dependent upon electrical methods for many ferro-alloys not otherwise obtainable, such as ferro-silicon having a high percent of silicon, high grade ferro-manganese, ferro-chromium, ferro-alloys of titanium, molybdenum, tungsten, vanadium, etc.

Classes of Electric Furnaces.

From the electrical point of view, the various styles of furnaces may be divided according to their construction, and the manner in which the electrical energy is utilized, into the following:

(A) Electrical Arc Furnaces. In this class of furnace carbon electrodes are employed, the heat being generated in the arc itself and absorbed by the material beneath, which is generally out of actual contact with the arc. Of this class of furnaces, those of Ernesto Stassano, and Ramon Chavarria-Contardo may be considered as typical.

(B) Arc-Resistance Furnaces. In this class carbon electrodes are also employed to convey the current to the mass under treatment. An arc is generally used to start the bath, when the current is passed through the molten material, or through a layer of slag floating on top of the bath, according to the disposition of the electrodes. To this class belong the furnaces of Charles Albert Keller, Paul Héroult, M. Harmet, and Sjostedt.

(C) Resistance Furnaces, with Granular Resistance. There are not many examples of this method of generating heat, although it certainly offers distinct advantages peculiar to itself. Paul Girod seems to have made the most progress with this type.

(D) Resistance Furnace, by Direct Heating. These are refining furnaces without carbon electrodes. In this class of furnace, as in the preceding class, an effort is made to dispense entirely with carbon electrodes in contact with the bath, to avoid introduction of carbon from the electrodes. Gustave Gin has developed one style of furnace of this kind, in which heavy currents are passed through t-- molten metal, and the Joule effect utilized to bring the material to the desired temperature.

(E) Refining Furnace, Heating by Induced Currents. In this type of furnace the heat is produced by induction, using the material as the secondary in a transformer. The credit for working out this ingenious type belongs to F. A. Kjellin, of Gysinge, Sweden.

[Mr. Bennie then took up each of the types of furnace mentioned above and by the use of lantern slides described their construction and operation. The Keller process is of special interest and the description is therefore reproduced.]

The Keller Process.

The Keller process is the invention of Chas. A. Keller, of Paris, technical director of the Compagnie Electro-Thermique Keller, Leleux & Cie. At present a plant is in operation at Livet, in the valley of the Romanche, near Grenoble, France, which is probably the largest electro-metallurgical plant in Europe. The Keller furnace bears a certain resemblance to a cupola or blast furnace, whence its name "electric blast furnace." Keller got his first satisfactory results in treatment of iron, in his two-electrode furnace. It consisted of a square chamber, with walls of brick, and a refractory bottom. The electrodes were placed side by side, and current passed between them, through the slag and molten metal. This furnace belongs to the class of resistance furnaces in which the electrodes are plunged into the materials to be reduced and fused. The process is generally started with a small quantity of material and an arc is sprung which quickly reduces the materials to a fluid state. Further material is added until finally the furnace body is comfortably filled, when fusion goes on quietly and continuously. In most cases when the furnace is under full way the electrodes are maintained at the level of the layer of slag floating above the liquid bath.

The most advanced type of Keller furnace consists really of two furnaces, of different construction, for primary fusion and reduction, and secondary treatment or refining. The upper or shaft furnace consists of a column of brick, holding the materials on the way to the hearth, and heated to a greater or less extent by the ascending gases from the action further down. To be economical, a furnace of this kind must accommodate a considerable quantity of materials to be treated. The upper furnace contains four electrodes, each of which is provided with its own raising and lowering apparatus. The bottom of the hearth is inclined towards the tap hole leading to the secondary or inferior furnace.

The elementary function of the hearth of a resistance furnace of this type is comparable to that of a blast furnace. The junction of the lower ends of the electrodes with the mass of material interposed between the poles of the furnace naturally becomes the hottest part. This zone of fusion may be compared to the high temperature regions around the tuyeres. There is a zone of high temperature at the base of each electrode, and the temperature can be regulated at any electrode by mechanical movement of the same. Separate current readings are taken for each electrode.

After several hours the molten metal is drawn off into the lower furnace, which has been previously heated, and already contains fused materials. When required the slag in the superior furnace is discharged through a tap hole. Both slag and metal are examined frequently and it is said to be possible to obtain extremely uniform metal. When the lower furnace contains a sufficient quantity of liquid metal, the refining process is started, and for this purpose a rather shallow furnace body is required, in which the metal is maintained in a condition of perfect fluidity and easily accessible. The rough metal may be decarburized by the "ore process," or by addition of scrap iron; purification is assisted by suitable additions of lime, etc. The elimination of impurities is quite rapid, owing to the high temperature which may be maintained.

Keller claims to have demonstrated experimentally that one kilowatt year will produce four tons or iron from the ore, which may be transformed into steel. This is equivalent to 2,190 kilowatt hours per ton, figuring on continuous working, or 8,760 hours to the year, or 0.25 kilowatt years per ton. By working upon scrap iron and steel the process is more rapid, and can be accomplished for 0.10 kilowatt year per ton, or 10 tons of steel per year per kilowatt.

The voltage is 25 to 30 for the upper furnace, and 50 to 75 volts in the refining furnace. Keller says that 10,000 h. p. would produce 60 tons per day of steel. In his address to the British Iron and Steel Institute Keller said that at Livet, with 1,000 h. p. furnaces, he could produce eight tons of steel per day from the ores, or 25 tons per day from scrap iron and steel, so that one ton of finished steel requires 2,800 k. w. hours.

The Canadian government recently sent a commission to Europe to report upon electro-metallurgical progress. Dr. Eugene Haanel, Dominion superintendent of mines, headed the commission. They visited Livet and Mr. Keller has informed us that several tests were made before the members, showing complete operation from ore to finished metal. The *Engineering and Mining Journal* of May 26 contains a note in which some figures are given as to costs, which are surprisingly low, and indicate marked advances over previous trials. This is to be expected with greater experience and skill in operating, which will come with time, as will other economies.

[The speaker then described and illustrated in turn the Heroult process, the Sjostedt furnace, Girod's furnace, the Gin process and Kjellin's process. Summing up, the following table was given, showing the comparative performance of the various furnaces:

Process	At	Power in H-P of Furnaces	Pounds per Day	Pounds per H-P day	Cost Estimate per ton	Raw Material	Annual Capacity 350 days
Stassano	Rome Darfo Turin	130 450 120	1600 —— 3500	12.3 —— 46.	—— —— $18.00	Italian Ore	900 tons
Keller	Livet	1000	16000 50000	16 50	$20.00 ——	Ore Scrap	2000 8750
Héroult	LaPraz	320	13200	41	——	Pig and Scrap	2260
Sjostedt	"Soo"	144	1440	10	$26.37	Iron Ore 3 pct. Nickel	225
Girod	Albertville	200	2640	16.5	——	Tungsten and Chromium *Ores	462
Gin	Plattenberg	530 530	54000	51	$17.00	Pig and Scrap	8000
Kjellin	Gysinge	225	9000	40	$42.00	Pig and Scrap	1578
Harmet	St. Etienne	——	——	——	——	——	——

* Producing tungsten or chromium steel.

Reference was also made to the work of Marcus Ruthenberg, who has obtained good results at his demonstration plant at Lockport, N. Y.]

It will be seen that the electro-metallurgy of iron and steel has already left the domain of the laboratory and experimental plant, and taken on the serious aspect of an established industry. The electric furnace has its limitations,

which it would be well to bear in mind. Even its most ardent advocates do not consider it a menace to the older methods, but rather as a new and useful adjunct to present metallurgical practice. It should be noted that while some processes are designed to perform the direct reduction of iron ores, the general tendency is to use the electrical energy for production of steel, and particularly as a refining agent in treatment of pig iron and scrap. For this field of usefulness, the electro-refinery seems destined to occupy a permanent place in the art.

When we shall witness the combination of the blast furnace for cast iron, the Bessemer converter for common steel, and the electrical refinery using energy generated from waste blast furnace gases, making higher grade steels, then industrial metallurgy will have attained the high-water mark in the utilization of the heat energy of coal. In attacking the older art from the crucible steel standpoint, electro-metallurgists are undoubtedly hitting at the weakest spot.

In concluding this paper, we take the liberty of making some reference to the application of the electric furnace to foundry practice, as being of more immediate interest to you. Take a foundry with a number of cupolas. It would be possible to arrange an electrical refining furnace so that it could use the product of any one or all of the cupolas. With the furnace body in the form of a ladle, placed upon a carriage, suitably counter-balanced, and able to swing free in a circle, it may receive its charge and then be placed under the arrangement for carrying the electrodes. By lowering the electrodes, turning on the current, refining may be carried out as previously described in several processes. Without using excessive currents, liquid iron may be converted into steel of good quality. This may suggest to some of your enterprising foundry managers ways of employing their full capacity at all times; to improve the quality of their castings; to convert a portion of the product into steel. For a small cost, a foundry arranged for the manufacture of cast iron could undertake steel castings and augment considerably its sphere of commercial activity.

As to electrical power, many foundries are already equipped. However, in discussing the matter with a well known central station manager, we were assured that they would welcome any proposition which would take power during their periods of light load, say from 10 p. m. to 1 p. m. next day, and could make very low rates for such intermittent power, to be taken at definite times. It would enable them to fill up the hollows in their load curves, and fill up their pocket books at the same time. Our laboratories have a very similar arrangement for some special power for electric furnace work, and foundry people would find it worth while to look into this question.

A final word of warning should be given, however. The construction of electric furnaces is not a simple matter. Results of a kind can be obtained by throwing four walls together and sticking a couple of electrodes in, and calling that an electric furnace. Satisfactory results require careful treatment of all the phases of electric furnace construction and operation, as well as considerable experience. Many processes have been failures due simply to the fact that those who tried them did not understand electric furnaces, and had developed a thoroughly inefficient practice. Money is saved in the end by a thorough understanding of what you are going to do before doing anything.

Negotiations have just been completed for the consolidation of the Southern Stove Works, of Richmond, and the W. J. Loth plant, of Waynesboro, Va., under the name of the Continental Stove Co., a new corporation. The deal means practically the absorption by the Richmond concern of the Waynesboro factory. The consideration was $300,000. The plans at present contemplate the continued operation of the Loth plant at Waynesboro for months to come. It is stated officially, however, that the branch will probably eventually be removed to Richmond. This will mean an enlargement of the Southern Stove Works. The Waynesboro branch employs about fifty molders.

On account of a lack of orders the entire plant of the Diamond State Steel Co., Wilmington, Del., has been closed. It is expected that the shutdown will not continue long.

TRADE PUBLICATIONS.

In a cloth bound catalogue of 150 pages, 9 × 12 in., the Marshall & Huschert Machinery Co., of Chicago and Cleveland, presents illustrations and descriptions covering the varied lines of machine tools handled by the company. The names of 30 manufacturers are given for whom the Marshall & Huschert Machinery Co. is agent, and, as may be inferred, the range of products is a wide one. In this catalogue the plan has been followed of putting the description of but one tool on a page, and the leaves are printed on but one side. For the most part, the illustration of the tool occupies the upper half of the page and below are given details with dimensions, sizes of machines, etc. Some well-known types of machine tools with recent modifications, particularly such as have been prompted by the growing use of high speed steels, appear on the well printed pages of the book. The frontispiece is a group of views of the Chicago and Cleveland offices of the company. It is stated that a specialty is made of furnishing machines fitted with electric motor drives, and nearly all of the tools shown in the catalogue have been so supplied.

From the Jeffrey Mfg. Co., Columbus, O., comes Bulletin No. 8, devoted to "Electric Locomotives for Gathering Purposes," also a supplement to the Jeffrey Century rubber belt conveyor catalogue. In the former the Jeffrey "electric mule" is shown in a number of illustrations, and a description is given of its construction, together with some record of its performance in recent installations. The distinctive feature of this electric gathering locomotive is that it may be operated over tracks where there is neither trolley wire nor steel rails. This is made possible by carrying upon the locomotive a reel of flexible insulated conductor.

In a 6 × 9 pamphlet, the Chandler & Taylor Co., Indianapolis, exploits its enclosed automatic engine, direct connected and belted. The Chandler & Taylor Co. has manufactured engines for about 45 years. The engines illustrated in the present catalogue are built in accordance with the recommendations of the joint committees of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers as to speeds, sizes of units and sizes of shafts.

"Perkins Power Presses" is the title of a catalogue of 176 pages, 5½ × 8 in. in size, published by the Perkins Machine Co., of Warren, Mass. A large number of presses known to the sheet metal trade are shown in the elaborate illustrations of this 1904 book, but for the sake of avoiding bulk the special presses made from standard patterns have been omitted. The catalogue is made more attractive by a series of small line engravings on the upper margin of the pages, illustrating various lines of work on which Perkins presses are employed.

In catalogue No. 38 the Newton Machine Tool Works, Inc., of Philadelphia, illustrate and describe their slotting machines, which have been increased about 30 percent in weight to meet the requirements of high speed tool steels. For the same reason there has been some change in the design of these machines. The pamphlet contains 24 pages and is fully illustrated. In the case of the portable slotting machines, a large floor plate is employed, and the machines are particularly adapted for work on electric machinery and large engines. The stroke is reversed with a straight and a cross belt similar to a planer, or with pneumatic clutches, and the machine can be fitted with a sub-base, giving an adjustment to the upright without unclamping it.

The Pennsylvania Railroad Co. has awarded a contract for the cement which will be used in its tunnel from Weehawken to Long Island City and in the terminal stations and powerhouses connected therewith, to the American Cement Co. of Philadelphia, through its New York branch, the United Building Material Co. This will doubtless prove to be the largest contract ever given for Portland cement. The largest contract hitherto was that for 1,500,000 barrels for the New York subway.

The Hickman Scale Mfg. Co., Des Moines, Ia., has been made defendant in an involuntary bankruptcy proceeding which has been instituted in the United States court by the filing of a petition of creditors.

NEW HAMILTON-CORLISS VERTICAL ENGINE.

Following the reconstruction of its entire plant, including foundry and machine shops, the Hooven, Owens & Rentschler Co., of Hamilton, O., has entered the vertical engine field. The new Hamilton-Corliss vertical engine which it has designed and patterned from the ground up since the opening of the present year, represents a number of features that warrant detailed description. The illustrations we present are of a 34 x 68 x 54 cross-compound engine recently installed at the Louisiana Purchase Exposition. It has a normal rating of 2,500 h. p. and is adapted to be direct connected to a 1,500 k. w. alternating generator. This engine has a speed of 83 revolutions per minute. The main bearings are 25 inches diameter by 42 inches long; the shaft in wheel and generator is 30 inches diameter; the crank-pin 11 inches diameter by 11 inches long; the wheel, 22 feet diameter, and the weight 120,000 pounds.

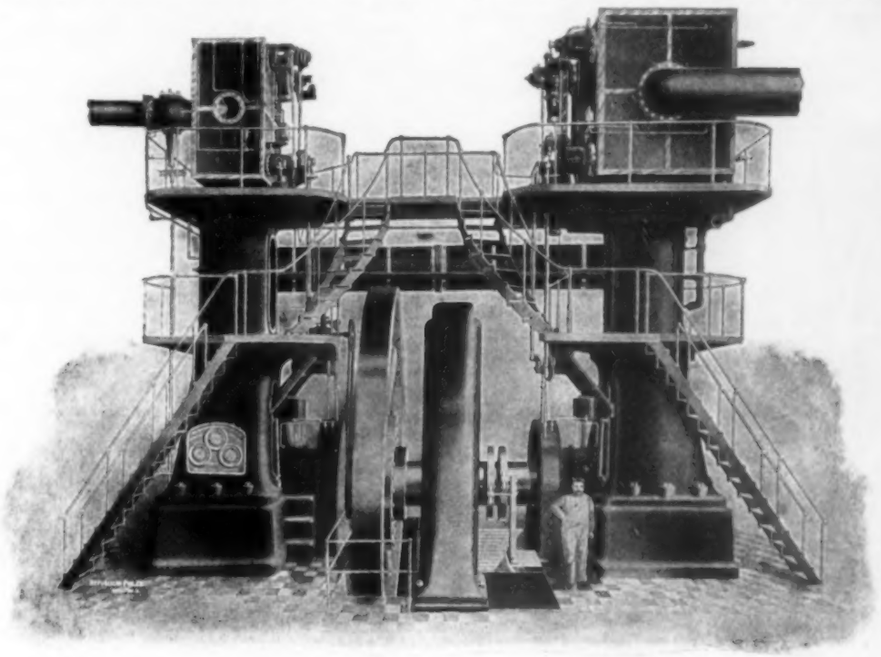


FIG. 1.—NEW HAMILTON-CORLISS VERTICAL CROSS COMPOUND ENGINE, 34 X 68 X 54 IN.

The bed plate is in one piece and is carried around the crank at full height, forming a deep crank pit to retain oil. The main bearing portion is bored and faced to receive the bottom box, which is of shell type, so arranged that it can be removed by raising the shaft enough to remove the weight from the box. The wheel is made in eight segments—a section of the rim and one arm to each segment.

The exhaust chambers are separated from the cylinder walls by an air space, the arrangement being such that there is a 2-inch space between the cylinder walls and lagging for non-conducting covering. They are lagged with sheet steel with bright polished angle steel. The valves are located in the barrels to avoid the inconvenience of having to disconnect the valve gear when the heads are removed. The valves are so placed, however, as to reduce the clearance to about the same as if they were in the heads by bringing the exhaust valves partly within the cylinder walls, although the valves never enter the space swept by the piston, while the piston is allowed to sweep past the ports. The arrangement is different on the steam valve side. The ports here are so arranged that the incoming steam strikes the piston squarely on the end, thus preventing any side shock or pound. Both steam and exhaust valves are double ported and have a short travel. The valves are cored. The pistons have a follower ring and one sectional ring which is pressed out by spiral springs held in place by tee-headed brass bolts. The pistons are forced on a taper and locked with a jamb nut and keeper.

The valve gear, illustrated in Figs. 3 and 4, differ somewhat from the regular type for Hamilton-Corliss engines. The steam and exhaust valves are actuated by separate eccentrics, direct, without wrist plates. The necessary motion is obtained by the use of levers and links on each bonnet separately, thus greatly reducing the strains. The dash pots are hung from the bonnets and are close to the cylinder, making a compact and self-contained arrangement, and are of a new noiseless pattern with the weight of the moving parts much decreased, being adapted for much higher speeds than usual. Both steam and exhaust cam rods have efficient unhooking devices so that the valve gear can be worked by hand to facilitate starting and warming up. The valves are double ported with very short travel. The dashpot levers are placed on the valve stems within the opening of the bonnet, hence are well supported on both sides to reduce wear. The releasing gear hooks and latch block trip plates have eight reversible wearing edges. The links have bronze connections with key adjustments. The weight of all reciprocating parts has been proportioned so as to make the forces on the pins as uniform as possible.

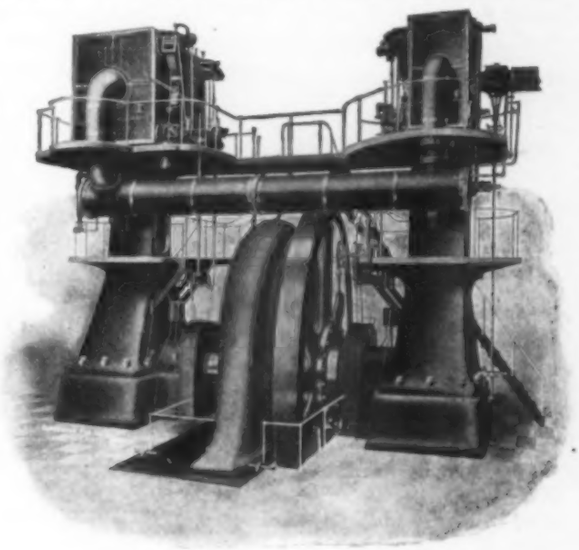


FIG. 2.—REAR VIEW OF CROSS COMPOUND VERTICAL ENGINE.

The crosshead is of steel, with cast iron slippers which are lined with phosphor babbitt, peined in. Each slipper has a wedge adjustment which is entirely independent, hence the position of the slipper is not changed by its movement. The slippers are fastened to the crosshead by means of several steel bolts, relieving the wedge bolts of any extra strain. Pis-

ton rods are fastened to the crosshead by thread, jamb nut and keeper.

The governor is of the makers' regular high-speed, center weighted, flyball type with motor and micrometer attachment for changing speed from the switchboard to regulate for throwing in parallel. It is placed on the first gallery platform and is easily accessible. Both cylinders are under control of the governor, and thus the work is properly divided to suit the load. The range of cut-off is from O to three-quarter stroke.

The main bearings are lubricated by a continuous stream of oil, which is furnished by an oil pump driven from the eccentric. The oil is pumped from a tank, located beneath the floor, to two receivers, which are over each main bearing cap, and thence it flows by gravity to all parts of the journal. The bottom box of these journals is cored out and arranged for water circulation. The eccentrics, crosshead slippers, crosshead and crank pins are oiled from a gravity feed system by multiple sight-feed tanks located on the upper part of the engine. The cross head slippers have wipers on the bottom end, which dip into reservoirs at the bottom end of the stroke, giving good lubrication of the guides. All the valve gears, rocker arms, etc., are lubricated by grease cups. The engine is furnished with oil guards and shields to prevent oil from being thrown on the floor. The eccentrics are inclosed to prevent oil creeping along the shaft and coming in contact with the wheel and generator.

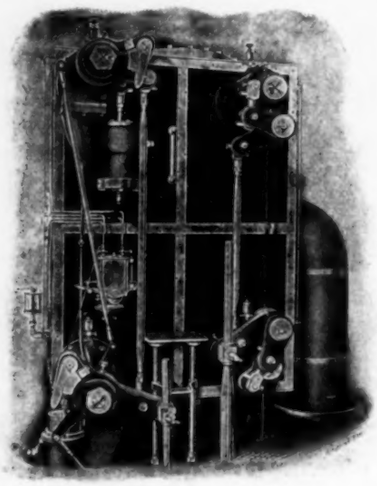


FIG. 3.—VALVE GEAR VIEW, HIGH PRESSURE CYLINDER.

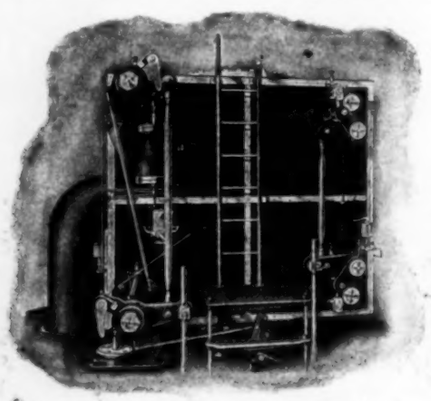


FIG. 4.—VALVE GEAR VIEW, LOW PRESSURE CYLINDER.

These engines will be made in all sizes from 16 x 32 x 36-inch to 48 x 96 x 60-inch and will be adapted for all medium speeds and any desired steam pressure, belted or direct connected.

The American Pig Iron Storage Warrant Co. had in yard on June 1, 75,242 tons of iron. There was put in the following week 800 tons and in the same time the withdrawals amounted to 1,100 tons, leaving net stock on June 8 of 74,942 tons.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The supervising architect, Washington, D. C., will receive sealed proposals until 3 o'clock p. m., July 13, for the low pressure steam heating apparatus, complete in place, for the extension to the U. S. Custom House and Postoffice at Hartford, Conn.

The American Shovel & Stamping Co., of Lorain, O., is in the market for a medium sized rolling mill, preferably one in which the machinery can be removed, although the company might consider the purchase of a mill to be operated at its present location.

The Bartlett-Tewksbury Machine Mfg. Co., Birmingham, Ala., has been incorporated with a capital of $25,000. Officers are: T. E. Bartlett, president; S. F. Young, vice president; J. W. Tewksbury, secretary and treasurer. The company will manufacture engines and sawmill machinery exclusively.

The Shawnee Brass & Iron Bed Mfg. Co., Shawnee, Okla., has been incorporated with a capital of $100,000. Incorporators art: D. N. Hallowell, M. E. Hallowell and H. T. Douglass, all of Shawnee.

The list of machinery to be installed in the new shops which the Illinois Central railroad is building at Memphis, Tenn., has not been announced, and it is not expected that bids will be called for until the completion of the buildings late in the summer.

D. B. Barbour & Co., Bluefield, W. Va., want machinery for handling sand from a bank 150 to 200 ft. away to an elevated bin for loading direct to cars.

Blackstone Manufacturing Co., Blackstone, Va., wants to correspond with manufacturers of air compressors.

Byers & Broaddus Co., West Point, Va., will buy 200-horsepower Corliss engine and two 125-horsepower boilers.

The Faunt Le Roy Co., 451 North street, Baltimore, Md., manufacturer of elevators, ask quotations on machine tools and equipment.

J. E. Bowen, Atlantic Office building, Norfolk, Va., wants second-hand 14-in. engine lathe, shaper and drill press.

H. P. Meiklehem, W. A. Marshall, J. W. Watkins and R. N. Towers will incorporate the Georgia Foundry & Machine Co., with a capital stock of $20,000 and privilege of increasing to $50,000, to operate foundry and machine shops at Rome, Ga.

F. W. Wurster & Co., Brooklyn, N. Y., have been incorporated, with a capital of $200,000, to manufacture machinery. Directors are: F. W. Wurster, E. T. Horwill, F. W. Wurster Jr, all of Brooklyn.

The Keystone Wire Matting Co., Beaver Falls, Pa., has been incorporated, with a capital of $25,000, to manufacture flat steel matting and wire door mats. Incorporators are: T. C. McPherson, G. W. Miller and J. A. Miller.

The Pressure Co. of America, New York City, has been incorporated, with a capital of $1,000, to manufacture pumps, etc. Incorporators are: L. Nixon, New York City; William G. Tiffany, Walnut Ridge, Ark., and Charles Drummond, London, England.

The H. Lohse Co. has been incorporated at Evansville, Ind., to manufacture and deal in galvanized iron, tin and cornice work, furnaces, etc. The company will continue operating the present plant, but will be conducted on a co-operative plan, taking in the employes as stockholders.

The Knoburn Co., New York City, has been incorporated with a capital of $5,000, to manufacture sheet metal work. Incorporators and directors for the first year are: D. P. Gallagher, E. A. Coursolle and E. O. Chatiguy, all of New York City.

The Heart Metal Wheel & Gear Co., Alexandria, Ind., has been incorporated with a capital of $10,000. Incorporators are: S. G. Phillips, John F. Merker, J. G. Brannum.

The Briggs-Weaver Machinery Co., Dallas, Tex., has been incorporated with $150,000 capital, to deal in machinery. Incorporators are: C. H. Briggs, J. C. Weaver and J. E. Thatcher.

The Wallis Stoker & Mfg. Co., Terre Haute, Ind., has been incorporated by President Mees and Prof. Gray, of Rose Poly-

technic Institute, of that city; R. G. Jemckes, Fred B. Smith, C. R. Duffin, of Terre Haute, and Henry Wallis, of Chicago. The company has a capital of $10,000 and will manufacture stokers and feed water heaters.

The Little Rock Boiler & Iron Works, Little Rock, Ark., have been incorporated with a capital of $5,000. Officers and incorporators are: C. C. Needham, president; Ed H. Colgan, secretary, and J. J. Koscielnig, treasurer.

The Free-Piston Gas Engine Co., Detroit, Mich., has been incorporated, with a capital of $125,000, to manufacture gas engines. Incorporators are: George Maitland, Henry C. Hart, Charles F. Burton and E. J. Stoddard.

The United States Standard Co., Voorheesville, N. Y., has been incorporated, with a capital of $2,000, to manufacture machinery. Incorporators are: Jesse S. Joslin, George A. Hallenbeck and E. D. Joslin, all of New York City.

The Findlay Foundry & Machine Co., Findlay, O., has been incorporated by E. C. Taylor, C. F. Speice, J. M. Stern, W. E. Gorell, D. H. Thomas; $50,000.

The Newell Foundry & Machine Co., Newell, Pa., has been incorporated with a capital of $15,000. Directors are C. L. Chester, Roscoe, Pa.; J. J. Thomas, Ellsworth, Pa.; K. W. Daly and J. J. Mott, Charleroi, Pa.

The Acme Wire Co., New Haven, Conn., has been incorporated, with a capital of $100,000, to manufacture wire and machinery. Incorporators are: Victor M. Tyler, New Haven; Edgar L. Haitpence, Newark, N. J., and Herbert E. Flather, Rome, N. Y.

The Automatic Electric Pump Co., Davenport, Ia., has been incorporated with a capital of $30,000. Incorporators are: Henry Brehmer, Oscar O. Denkman, William Pugh, F. J. Pete and Henry Abel. Henry Pugh will be president and treasurer, William J. Pugh vice president, and F. J. Pete secretary.

The Great Western Iron & Metal Co., Chicago, has been incorporated, with a capital of $5,000, to manufacture in metals. Incorporators are: Max Weinstein, S. P. Lipsey and Ralph Lipsey.

The Globe Iron Works, Chicago, have been incorporated, with a capital of $100,000, to manufacture iron and steel. Incorporators are: William B. Frolichstein, H. R. Wilson and Irwin L. Levy.

The George Stikeman Metal Works, New York City, have been incorporated, with a capital of $25,000, to manufacture in metal. Incorporators and directors for the first year are: George Stikeman, George Stikeman Jr, Ramsey, N. Y., and William D. Jones, Brooklyn.

The Automatic Roller Window Screen Co. has been incorporated at Buffalo, N. Y., with a capital of $50,000. Directors: Wm. Thompson, Wm. H. Brace and Charles Newton.

The Wright Taper Roller Bearing Co., Buffalo, has been adjudged an involuntary bankrupt, upon petition of the Queen City Engineering Co. and two other concerns of that company.

The Pittsburg Clay Products Co., of Pittsburg, has been organized with $5,000 capital. Thomas B. Freeman, L. D. Strouse, George M. Hosack, J. W. Boileau and W. S. Ravenscroft are the incorporators. A fire brick plant will be erected.

The Reese-Hammond Fire Brick Co., of Greensburg, Pa., has been incorporated with a nominal capital of $5,000. J. S. Beacom, C. E. Heller and F. D. Taar are the incorporators. This new company has been organized in line with the reorganization plan of the Reese-Hammond Fire Brick Co., now in the hands of a receiver.

The Cosmopolitan Coal & Coke Co., of Pittsburg, has been incorporated under the laws of West Virginia with a capital of $1,000,000. The company has secured 9,617 acres of coal land in Braxton county, W. Va., and a coking plant is to be built. W. H. Cochran, William Moor and B. S. Forsythe, Dawson, Pa.; B. O'Connor and R. J. Shepherd, New Haven, Pa.; P. Buffano, Connellsville, Pa.; A. K. Notts, Uniontown, Pa.; N. J. Mapel, Morgantown, W. Va.; and John W. Boileau are the incorporators.

The Butler Engineering Co. has been organized at Butler, Pa., for the purpose of engaging in the manufacture of gas and gasoline engines. A site for the erection of a new plant has been secured at East Butler.

The McConnell Wheel & Mine Supply Co., Uniontown, Pa., has been organized with a capital of $100,000, and has purchased the plant of the Keystone Foundry Co., which was sold by the Second National Bank of that place. In addition to a complete new power plant, a brick foundry 68 x 272 feet is to be erected.

The Pressed Steel Pole Co., of Pittsburg, has been incorporated with a capital of $125,000. The company will manufacture a new type of trolley pole under patents secured by C. L. Wilson. At present the Pressed Steel Car Co. will manufacture the poles, but later the company will erect a plant of its own.

Fires and Accidents:—

Fire believed to have been incendiary totally destroyed Machinery Hall, 54 to 60 South Canal street, Chicago, June 8. The principal losses were the following: John B. Lukenitsch, $50,000; Graton & Knight, $25,000; Union Drawn Steel Co., $25,000; New York Safety Steam Power Co., $15,000; James & Foote Co., $30,000; American Hoist & Derrick Co., $20,000; Orrin Seennbauer, $10,000; A. M. Castle Co., $12,000; A. M. Holland, $20,000; Maypole Bros., $115,000.

Rensselaer Polytechnic Institute, Troy, N. Y., suffered a severe loss, when its main building was destroyed by fire, June 9, supposed to have been of incendiary origin. The loss will amount to about $100,000, with insurance of $48,000. A large part of the loss includes mathematical instruments and scientific apparatus, as well as a valuable scientific library, much of which cannot be replaced.

Fire in the plant of the Western Fuel Co., at Nanaimo, B. C., destroyed the engine room, car shop, blacksmith shop and a number of cars. Loss, $75,000.

Fire, June 9, in the chemical laboratory of the plant of the Illinois Steel Co., in South Chicago, caused a loss of $2,000 worth of materials and $5,000 on the building.

Fire which originated in the shipping room of the Patent Vulcanizing Roofing Co., Chicago, June 10, caused a loss of $20,000 on building and contents.

The plant of the Fanner Mfg. Co., Cleveland, was visited by a disastrous fire June 11. The flames were first noticed in the core room, from which they spread rapidly to the main building, which, in spite of the fact that it was supposed to be fireproof, was soon a total wreck. The loss is estimated at $35,000 on buildings, $35,000 on machinery and from $75,000 to $85,000 on stoves and others finished products and raw material. The clearing away of the debris is now in progress and the rebuilding will commence in a few days.

New Construction:—

B. F. Yoakum and associates, comprising the St. Louis syndicate which contributed $3,000,000 for the construction of the St. Louis, Brownsville & Mexico railroad, have purchased one-half the capital stock of the Brownsville Land & Town Co., owning 2,600 acres of land at Brownsville, Texas. With this sale is closed an agreement for the railroad company to build machine shops, warehouses, depot and other railway facilities to cover 30 acres of land. Col. Uriah Lott is president of the railroad company, and F. G. Jonah chief engineer, both of Corpus Christi, Texas.

The Emergency Car Brake Co., Cumberland, Md., will erect a plant for the manufacture of a patented car brake; Henry French, general manager.

Within a few days the work of building the brake shoe works to be erected by Morris & Lewis, at Rock Island, Ill., will be begun. The firm has four acres, and the plant was to have been built some time ago, but obstacles arose. The plans for the plant have been completed and the contracts let. The foundry and machine shop will be erected at a cost of $25,000.

The Muskegon Boiler Works, Muskegon, Mich., of which C. D. Stevens is the proprietor, is considering plans for the erection of a new plant. The main building will probably be 50 × 330 ft.

The Tomahawk Iron Works, Lincoln, Wis., have been sold to William Drever, C. H. Macfarlane and John Knaggs. The business will continue to be conducted under the name of the Tomahawk Iron Works, and the plant will be enlarged and improved.

The Otto Gas Engine Works, Philadelphia, has purchased

a tract of land at Wilmington, Del., on which it will erect a much larger plant than the one in Philadelphia. It is expected that when the plant is in full operation it will employ about 2,000 skilled workmen.

The Andrews Wire & Iron Works Co., Rockford, Ill., is having plans prepared for a new plant to be erected this summer. The plans call for a main building 148 × 68 ft., two stories, and a one story triangular structure, 49 × 68 × 67 ft. for a boiler and engine room and the wire storage.

The Lion Fence Co. has been organized at Adrian, Mich., with a capital of $150,000, all subscribed, and will erect a building 160 × 50 ft.

Burt Dottke, proprietor of the Oshkosh Brass & Iron Works, Oshkosh, Wis., is building a foundry in which he expects to conduct a general foundry business, making a specialty of sash weights, washers, etc.

The Fulton Foundry & Machine Co., of Atlanta, Ga., will construct several new buildings during the summer, including a pattern shop.

The Wellsburg Mold & Foundry Co., of Wellsburg, W. Va., recently incorporated with a capital of $25,000, has let contracts for a foundry building 69 by 100 feet.

The Hanks Foundry, of Rome, Ga., has just completed additions which will double the capacity of the plant.

General Industrial Notes:—

The Armac Motor Co., St. Paul, Minn., has for the past two years manufactured the Armac motor in a small way. The motors have met with such success that the company has been incorporated and will increase its facilities. It does not intend to build this season, but in a few days will move into its new quarters at 116 West Third street, St. Paul, where it will have more than four times the floor space it now has, and will then install new and modern machinery, suitable to handle the manufacturing of every part of its motors and motor cycles. The company will manufacture for the trade, and its line will be the Armac one-piece cylinder 3-h. p. motors, castings for the same in the rough or finished, complete motor-cycles, motor-cycle frames, Armac patent aluminum mufflers, Armac V-belts, spark coils, carburetors, tanks, pulley rims and, in fact, all the motor-cycle accessories.

The Ohio Pump Co., Port Clinton, O., recently incorporated, does not expect to build or to purchase machinery for four or five months, but will have its pumps made on contract.

The Southern Indiana Machine Works have been established at Princeton, Ind. The company is headed by Phil L. Drescher, formerly general manager of the Southern railroad shops at Princeton. A building has been rented and machinery is being installed.

The Sandusky Boiler Works have been established at Sandusky, O., with J. J. Blainey in charge. The proprietors are Blainey & Moore, of Toledo.

Among orders taken recently by American concerns for export are the following: The Hess Machine Works, Philadelphia, German and Swedish orders for file-making machinery; The Falkman-Sinclair Co., Philadelphia, a large straight side press, Manila; William White & Co., Moline, Ill., machinery to be installed in the Canadian plant of the American Locomotive Co.; Philadelphia Pneumatic Tool Co., a number of German, French and Belgium orders; The American Pulley Co., Philadelphia, pulleys to be sent to Australia and New Zealand; The Gardner Governor Co., Quincy, Ill., pumps for Japan, Russia, Australia and Cuba.

The Lenoir Car Works, Lenoir City, Tenn., are now operating under an independent charter, which has been issued by the secretary of state, with an authorized capital of $100,000. Incorporators are: Samuel Marfield, C. E. Lucky, E. T. Sanford, J. A. Fowler and William Slattery. This concern was involved in the receivership of the Southern Car & Foundry Co., of which it was a part. Recently the property at Lenoir City was sold to Moore & Schley, of New York, bankers.

Charles M. Dickenson, American Consul-General at Constantinople, in a report to the State Department, states that more than two-thirds of the 10,000 sewing machines sold in Constantinople in 1903 were of American make.

The Atlantic Rolling Mills & Tin Plate Co., which began the installation of a plant at Atlanta, Ind., about two years ago and then suspended work on account of a difference between members of the company, has readjusted its affairs and will push the enterprise to a consummation. Shipments of machinery to install the plant have been ordered.

Milliken Bros., New York, have been awarded the contract for the steel to be used in the construction of the central power station for the Manila Electric Lighting & Traction system, the contract for the building of which was recently allotted.

Advices from South Africa state that there will soon be an increased demand in that country for traction engines and motor-wagons for industrial purposes. The use of gas and oil motors is becoming more common, the gas motors being used in towns and the oil in the rural districts. Manufacturers are urged to disseminate information concerning the working of gas and oil motors.

The Buckeye Forging & Specialty Co., Sebring, O., recently incorporated, has purchased the entire properties, plants, equipments and patents of the Sebring Forging Co. The capital stock is $60,000, all subscribed for. The company is fully equipped with modern and up to date machinery and is making specialties of certain forgings. At present it is making the Renner wrought iron tubular turnbuckles, and has sufficient orders on hand to keep the plant busy on this article alone for the rest of this year. Following are the names of the five members of the company: W. E. Renner, president and general manager; Louis Hoechstetter, secretary and treasurer; F. A. Sebring, O. H. Sebring, E. H. Sebring.

The Hayden Automatic Block Machine Co., Columbus, O., recently organized, will build for the trade automatic block machines for the manufacture of cement blocks for building purposes. This company is composed of members of the P. Hayden Saddlery Hardware Co. and some employes, among whom are expert machinists.

R. Preston Means announces that he has disposed of his holdings in the Means-Fulton Iron Works, of Birmingham, to R. C. Ricker, of Portsmouth, O., who has been elected president and treasurer of the company as successor of Mr. Means.

The Detroit Steel Products Co., of which Walter S. Russell is president, has leased a building at 91-99 Fort street east, where it will manufacture springs for automobiles and other vehicles.

The Geiser Mfg. Co., Waynesboro, Pa., has purchased the plant of the Greencastle Mfg. Co., Greencastle, Pa., and will put it in shape as rapidly as possible to manufacture gas engines. The engines of the company were formerly made at Quincy, Pa., and on May 29 the plant was destroyed by fire.

T. H. Molten and Frank Nelson Jr., of Birmingham, Ala., are negotiating with a company at Hudson, Mich., which proposes to establish a wire fence manufacturing plant in Birmingham.

The Rochester Bridge & Construction Co., Rochester, N. Y., has been awarded a contract for the construction of a steel bridge over Chautauqua creek, at Westfield, N. Y.

The Erie Basin Ship Building Co., Buffalo, N. Y., has been adjudged an involuntary bankrupt. The first meeting of the creditors will be held July 1.

Mills 9, 10, 11 and 12 of the Monessen, Pa., tin plate works of the American Sheet & Tin Plate Co. were placed in operation this week, after an idleness of nearly a month owing to a disabled engine.

The Mingo Junction, O., plant of the Carnegie Steel Co. has been shut down owing to the dull trade conditions. This plant contains three furnaces and a Bessemer converting department, the former having an output of 500,000 tons annually and the latter 450,000 tons. One of the idle stacks will be relined.

The Washington Water Power Co., Spokane, Wash., has placed a contract with the William B. Pollock Co., Youngstown, O., for a large water standpipe. This company has just installed a modern hydraulic flanging plant of the largest size built. This additional equipment enables the company to bend and shape the heaviest sections of material and to flange plates up to 2½ inches in thickness.

The steel rail committee of the United States Steel Corporation inspected the rail mill at the Ohio plant of the Carnegie Steel Co. at Youngstown, O., last week. It was stated that there is no intention at present to operate the rail mill. The committee consists of J. H. Gray, D. Mathias, H. C. Ryding and D. Miller.

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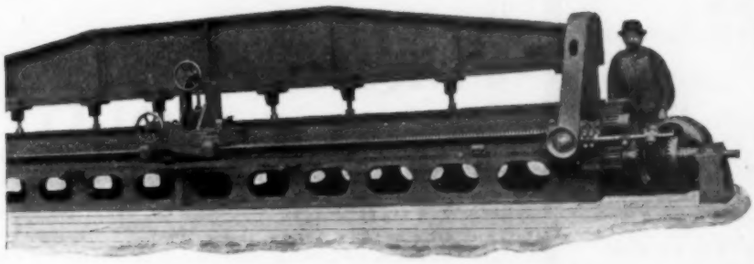

equipped with stationary girder and movable jack screws for clamping plate.

Cutter head carries two tools, one cutting in each direction and shifting automatically.

Plates may be also bevelled on this machine.

This planer has capacity to plane 1-inch plate.

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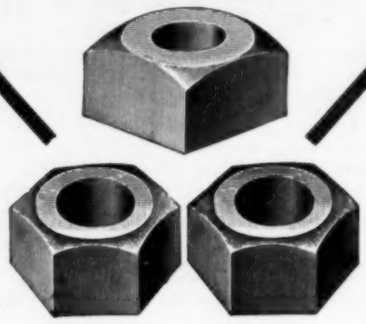

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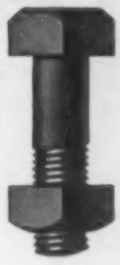

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